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Biological Reactions Following Parenteral Administration of Protein Bodies in Tuberculosis of Children.—This study was promoted by the favorable reports of Czerny and Eliasberg, following the injection of normal horse and sheep serum in the cachexia of tuberculosis. A total of 1800 subcutaneous serum injections was given to 46 children with advanced tuberculosis, the injections being given at first twice a week and later daily, in amounts of 0.5, 1 and 2 cc. In only 7 of the 46 children was a febrile reaction noted following the injection, this being absent even after as many as 130 to 150 daily injections. Focal reactions in the tuberculous processes, with possibly one exception, never occurred. Serum reactions were less frequent and weaker when small amounts of serum were given daily than with larger injections at longer intervals, but despite this fact anaphylactic shock was occasionally encountered. Sensitization reactions apparently increased with the number of injections. Serum therapy was followed in most cases by gain in weight and improvement in the general condition.—*Die biologischen Reaktionen nach parenteraler Zufuhr von Proteinkörpern bei Tuberkulose im Kindesalter, B. Epstein, Jahrb. f. Kinderhk., 1921, xcv, 52.*

Psychochemical Treatment of Pulmonary Tuberculosis.—Chronic pulmonary tuberculosis is treated in various ways, although it must be confessed with no great success in any one direction. Antituberculosis serotherapy has not fulfilled promises and tuberculin can never avail much because it has no specific action, is only partially remedial and can be used only in a limited proportion of cases. Chemotherapy has been disappointing, but may become valuable when a better knowledge of the action of ferments and physical chemistry has been acquired. Medicinal and most surgical measures are only alleviative in effect. Artificial pneumothorax, although not often curative, is valuable in some cases in arresting the progress of the disease. In the *La Presse Médicale*, October 5, 1921, Dr. Louis Renon discusses the treatment of the disease by psychochemical means. He emphasizes the salutary effect of suggestion on tuberculous invalids, and explains on this ground the apparent satisfaction given by any mode of treatment provided it is harmless. On this principle he has tried the "method of successive analogous medications;" that is, the association of the chemical action of the drugs on the disease with the physical action which they can be made to exert on the patient. As the duration of the latter action rarely exceeds three weeks, it becomes necessary at the expiration of this period to alter the treatment. The drugs should be given in small doses and must be harmless; they include iron, lime, silica, arsenic, carbonates, phosphates, and organotherapeutic products. One of these drugs is given for a period of twenty days, after which a drugless interval of eight or ten days is allowed to elapse; then another medicine is given for a similar period. At the end of three months the course is repeated. The psychotherapeutic factor of cure is of the first importance in the treatment of disease, especially tuberculosis. Other measures have been disappointing and sanatorium treatment has not given the results hoped for. Climatotherapy, organotherapy and treatment by fresh air and good food increase the defensive powers of the organism. Such excessive measures as absolute repose have been wholly abandoned, and forced feeding does not find favor now. The sheet anchors of treatment are proper diet and a sufficiency

of exercise and fresh air. The chemical treatment of tuberculosis has for its special object the remineralization of the organism in accordance with the principle laid down by Robin, to recalcify by Ferrier's method and to remedy the insufficiency of the glands of internal secretion. Renon's method of successive analogous chemical medications given on psychotherapeutic principles, combined with the so called rational treatment by fresh air, rest and good food, is an advance on this form of treatment, since it largely depends on the influence of mind over body.—*Editorial, N. York M. J., December 7, 1921, xciv, 658.*

Silicates in Therapy of Pulmonary Tuberculosis.—It has been held that silicates are of importance in the healing of pulmonary tuberculosis. Silicates are absent in the lungs of the newborn, but appear very early in life and increase to 10.8 per cent silicon in the adult lung stroma. An attempt was made to determine the value of silicates in the therapy of pulmonary tuberculosis of both animals and patients. Guinea pigs, injected with colloidal silicon prior to infection (half of these animals died of an intercurrent pneumonia a few weeks after infection), revealed no trace of tuberculosis, and were still alive after four months, while controls had an extensive tuberculosis four weeks after infection. A second series gave similar results. The clinical experiments extended over four years. Certain herbs with high silicon content were brewed into tea and given daily. The herbs used were *Herba polygon* and *Herba galeopsidis*, which, when boiled down to half their volume, contain in three cups (daily dose) 43 to 272 mgm. silicon. Absorption of silicon is evidenced by its increase in the urine (70 to 180 mgm. per day), far in excess of the normal. Tablets in pure form were also administered by mouth in 0.1 gm. doses, these being more certain in dosage than the tea. The silicon content of the blood rose 37 per cent during treatment. Whether the lung stroma increases in silicate content under this treatment is still undetermined. The best method of administering the silicate therapy is in conjunction with the usual dietary, rest and other accessory measures. Patients persevering in this treatment reveal a more chronic process with an increase of scar tissue. Intramuscular injections of 2 cc. of 1 per cent colloidal silicon are somewhat painful, and cause a slight infiltration locally, both of which soon disappear. It is questioned whether the intramuscular mode of administration is superior to the oral. One hundred grams of barley made into gruel contain 800 mgm. of silicon; beer 228 mgm. per litre. The following diet is suggested for pulmonary tuberculosis. *Breakfast:* malt coffee and two cups of the silicate tea mixture (*Kieselsäureteegemisch*), a couple of slices of barley bread, butter, and honey. *Noon*: bouillon, an abundance of vegetables especially the leaves and stems, salads of all kinds, jam, fruit, and mineral water. *Afternoon*: malt coffee or two cups of silicate tea, and barley bread. *Evening*: barley or millet gruel, eggs, vegetables, salads, etc., and malt beer. A more extensive trial of this therapy on the part of institutions and clinics is receommended.—*Neue Probleme in der Behandlung der Lungentuberkulose mit besonderer Berücksichtigung der Kieselsäurefrage, A. Kühn, Ztschr. f. Tuberk., September, 1920, xxxii, 320.*

Action of Iodine Compounds on the Blood and Its Application in Tuberculosis.—The effect of "sodium iodate" (probably means iodide) upon the blood of rabbit and man was studied. Large quantities cause a diminution in the erythrocytes and reduction in hemoglobin, while the polymorphonuclear leucocytes increase numerically. A moderate quantity causes a temporary increase in the amount of blood, but by repeating daily an anemia may develop subsequently. A small amount, administered for a long time, causes a marked increase in the number of erythrocytes and hemoglobin, with a marked increase in the number of leucocytes, especially the lymphocytes. These facts indicate that iodine and its preparations should be one of the best drugs for the treatment of tuberculosis.—*On the Action of Iodine on the Blood Together with the Notices on the Clinical Application of Iodine Preparations against Tuberculosis, Y. Yamada (Osaka Igakkwai Zasshi, March, 1921), Japan Med. World, July 15, 1921, i, no. 3, 23.*

The Nascent Iodine X-ray Treatment of Lupus.—Bessunger's method, described in 1918, was applied with slight modifications to 35 lupus patients with 63 separate foci. The method consists of (1) taking by mouth 4 gm. *iodolyt* in two doses; (2) half-hourly massage of the infected foci with *iodolytesseracetronlanolin* mixture, followed by (3) the roentgenization of the massaged area through a 3 mm. aluminum filter. The raying breaks down the complex iodine compound into nascent iodine. The latter within a few hours produces an inflammatory reaction, which in seven to eight days produces ulceration. Moist compresses and ointment containing some silver salt are applied to the ulcerated areas which, in favorable cases, clear up, and heal in a few

weeks with the disappearance of the lupus nodules in cured cases. The modifications of the above method follow. The massage was carried out, after applying disinfectants to the areas to be treated, with the index finger covered with sterile rubber to prevent secondary infection. All crusts are removed and a free oozing of lymph is favored, to promote absorption of the iodine compound. In spite of these precautions, 5 erysipeloid conditions resulted in the cases treated. Another modification was introduced for oral iodine administration: Three hours before application of the X-ray, 2 gm. more of *iodolyt* were administered (a total of 6 gm), within about twelve hours. In some cases sodium iodide was given shortly before roentgenization; in others, no iodine compound was given by mouth at all. Bessunger's method of roentgenization was likewise modified. The Holzknecht-Saboureaud-Noire pastille method, 12–16 X through 3 mm. of aluminum, was employed. A 40–60 cm. induction coil, partly with electrolytic interrupter, partly with a mercury interrupter, with a current of 2 M A and a spark gap of 22 to 24 cm., for thirty to thirty-five minutes in adults (less in children). The results of the above described therapy were as follows: of the 63 foci, 26 were clinically healed; 29 manifestly improved; 2 relatively unaffected; 6 still being treated. The foci that were considered healed showed a complete disappearance of nodules by the most careful examination, with the aid of phaneroscopy. Those designated as manifestly improved showed no nodules upon external examination but only by phaneroscopy. The lesions that were designated relatively unaffected showed a recession of the nodules, but the clinical picture still remained that of lupus. The reason assigned for the partial and complete failures is that the iodine which is rendered nascent by the filtered X-rays, and is the agent producing the ulceration, does not penetrate equally well (or at all) the more deeply seated foci. It is the ulceration produced, with consequent liberation of organisms from the nodules, that is considered paramount in bringing about beneficial results.—*Über das Bessungersche Lupus-heilverfahren, K. Moncorps and M. Monheim, Ztschr. f. Tuberk., April, 1920, xxxii, 23.*

Krysolgan in Laryngeal Tuberculosis.—The intravenous injection of krysolgan causes demonstrable reactions and leads to extensive healing in mild tuberculosis of the larynx, even in the presence of advanced pulmonary tuberculosis, and has also a favorable effect in more severe cases. In a certain number of cases, however, it is without action. In suitable cases, krysolgan can be combined with certain operative procedures in the hope of obtaining better results.—*Erfahrungen mit Krysolgan bei Kehlkopftuberkulose, H. Wernscheid, Beitr. z. Klin. d. Tuberk., October 23, 1920, xlvi, 15.*

Experiences with Krysolgan.—Mostly chronic progressive tuberculous cases were treated with 12 intravenous injections: 4 of 0.05, 4 of 0.1, and 4 of 0.2 gm. The last dose, should not be exceeded. The effect of these injections upon the temperature was practically nil, with an occasional evening rise of temperature on the day of injection. In one patient the temperature dropped slightly every time following injection. Other untoward reactions, such as vertigo, arose only when injections were too frequent or the injecting fluid was too cold. If any of the fluid escaped into the tissues, a moderately painful infiltration resulted, which was not nearly so painful, however, as that resulting from salvarsan. A herpes zoster arose in one case. After injection the visible foci became red and swollen; and while this reaction continues no injections are made. The interval between injections is usually about ten days. However, these reactions gradually lessen in intensity, which may perhaps be explained, on the one hand, by the organism becoming "gold-resistant" and, on the other, by the progress of the healing process occurring in the connective tissue. Beneficial results were noted in cases of laryngeal tuberculosis, in which at times krysolgan alone and at others krysolgan combined with local treatment was administered. No beneficial results were obtained in pulmonary tuberculosis. No harmful results, however, were noted.—*Erfahrungen mit Krysolgan, H. Keutzer, Ztschr. f. Tuberk., April, 1921, xxxiii, 337.*

Treatment of Skin Tuberculosis with Lecutyl.—Lecutyl is an abbreviation for copper-lecithin and is prepared by combining an alcoholic solution of lecithin and copper salts. It is a dark green powder which is soluble in ether and in chloroform. For external use lecutyl is incorporated in a lipoid base as a salve, in the proportions of 100 parts, 5 parts of copper and 10 parts cycloform. For internal use it is prepared in pill form containing 0.05 mgm. copper. *Method:* At first a combined internal and external administration of the copper was instituted. Internally, two pills were given three times daily. Later, the copper preparation was applied only to the skin, first every day, then every two or three days.

The lecutyl salve was applied only to the diseased skin and covered with a linen dressing, over which was placed any waterproof fabric. If the skin was ulcerated the salve was applied to the dressing and not directly. If the mucous membrane of the nose was affected, the salve was forced into the nares by means of a syringe. This treatment was supplemented with heliotherapy or artificial radiation in a light chamber. A general reaction from the ingestion of lecutyl was obtained in only one patient with a resulting gastralgia. No untoward results externally were noted: only at the point of the lupus nodules there were signs of a necrosis. It selects, more specifically than does pyrogallol, the diseased tissue. The resulting cicatrices are soft and have even surfaces. The application of lecutyl not infrequently produces pain, especially when the lesions are on the face.—*Behandlung der Tuberkulose der Haut mit Lecutyl, W. Fink, Ztschr. f. Tuberk., February, 1921, xxxiii, 215.*

Action of Camphor in Hemoptysis.—Hemoptysis may arise, first, from passive congestion of the lung, due to a weak heart,—congestive hemoptysis. The blood expectorated in this condition is dark brown, and small in amount; the pulse is weak; and the blood pressure is low. Camphor when administered in small doses at frequent intervals brings about an increased efficiency of cardiac contraction and a stimulation of the cardiac nerves, especially of the vasomotor centre. The volume of blood thrown into the aorta in unit time is increased. The difference between the systolic and the diastolic blood pressure is increased. Vagus irritability is lessened. Thus, there results from the administration of camphor a mechanical displacement of the congested central to the peripheral circulation. Besides this, the respiratory centre is stimulated with consequent quiet and deeper respiration. The other form of pulmonary hemoptysis is that due to rupture of blood vessels (artery or vein) resulting from tuberculous erosion of vessel walls. This blood is brighter, larger in amount and frothy; and the blood pressure and pulse are normal. In this, the most common form of hemoptysis seen in tuberculous persons, the administration of camphor in large amounts (dosage not mentioned in 20 per cent solution), by its stimulating action upon the vasoconstrictor centre, is thought to favor hemostasis and thrombosis at the point of rupture. The rise in blood pressure, whether this really occurs even though vasoconstriction is occasioned, does not seem to interfere with a favorable action. It is concluded that camphor acts principally on a mechanodynamic, rather than upon a fermentoserological, basis in arresting pulmonary hemorrhage.—*Lungenblutung und Kampferwirkung, K. Zehner, Ztschr. f. Tuberk., August, 1920, xxxii, 276.*

Treatment of Hemoptysis.—Pulmonary tuberculosis is the most frequent cause of hemoptysis. The underlying pathological change may be a softening tubercle in a blood vessel wall, a ruptured aneurysm of a vessel that has lost its supporting structures, exudative inflammation or capillary oozing. The size of the vessel and the extent of the rupture determine the amount of bleeding. Most hemorrhages occur while the patient is at rest or asleep, or after negligible body movements. Cough and other respiratory efforts are the most important precipitating causes. Treatment should be directed toward preventing dislodgment of the clot that forms and organizes in the vessel wall, and toward preventing aspiration of large quantities of blood, syncope, shock and such complications as atelectasis and aspiration pneumonia. The classical immobilization treatment tends to frighten the patient, and may predispose to serious complications. Moderate body movements may raise peripheral blood pressure, but have little or no effect on the pulmonary circulation; they may, therefore, be allowed. The patient is placed in bed in a semirecumbent position but may be put flat on his back when there are indications of exsanguination. When active bleeding has stopped, more freedom of movement may be permitted; but the patient should be kept in bed for eight days or longer after blood streaks have disappeared from the sputum. Morphine should not be used; codeine, heroin and dionin are preferable, because they are effective in allaying cough and do not prevent free and easy expectoration. Bromides may be used if the patient is restless; they probably increase the coagulability of the blood. There seems to be no rational indication for the use of the ice bag. The internal administration of ice is also of questionable merit, since irritation of the gastric and intestinal mucosa by cold produces a reflex dilatation of the pulmonary vessels. The value of drugs is a matter of dispute. One to three drams of table salt dissolved in water may be administered through a drinking tube, five or six times a day, placing the tube as far back as possible on the tongue. It may be given intravenously in doses of from 2 to 10 cc. of a 10 per cent solution. The addition of a 0.02 per cent solution of calcium chloride may help, but its escape into the subcu-

taneous tissues should be prevented, since it causes severe pain. If a sedative is indicated, 30 grains of sodium bromide may be given three times daily instead of the table salt. Ergot, digitalis and amyl nitrite raise the pulmonary pressure and adrenalin stimulates the heart; therefore, they should not be used. Lead acetate, stypticin, calcium chloride and animal serum have no value. Chloroform inhalation is said to lower pulmonary pressure but has gained no recognition. Emetine hydrochloride, presumably by lessening pulmonary congestion, sometimes acts rapidly, especially where the disease is not far advanced. To patients with low blood pressure 0.5 grain is administered hypodermically in 1 cc. of water; where the pressure is above 130, 0.75 grain may be given in like manner. Camphor in oil has been tried at the Montefiore Hospital without satisfaction; some patients have had severe reactions. Bandaging the extremities may help in uncontrollable hemorrhage. Artificial pneumothorax is most efficacious if adhesions do not interfere. The diet should consist of lukewarm, soft or semiliquid foods. Laxatives should not be employed for a few days after active bleeding has stopped. The principal function of the physician is to reassure the patient, to allay mental excitement, to lessen excessive cough, to place the patient in a comfortable position at reasonable bodily rest and to avoid meddlesome therapy.—*Practical Points in the Treatment of Pulmonary Hemorrhage, H. Schwatt, N. York M. J., December 7, 1921, cxiv, 631.*

Treatment of Leprosy.—Emphasis is laid upon the modern point of view that leprosy, until recently considered incurable, is now known to be a curable disease. The results of the treatment of leprosy during the last three years are reviewed. Two chemotherapeutic agents are in use: (1) derivatives of chaulmoogra oil, and (2) derivatives of oil of nim. Chaulmoogra oil is used either in the form of a soap made from it, the sodium gynocardate of Rogers, or in the form of ethyl esters of its fatty acids (MacDonald and Dean). Treatment, which is carried out intramuscularly, intravenously, subcutaneously and by mouth, leads in the course of two to four years to total regression of lesions, and disappearance of bacilli from the lesions and nasal secretion provoked by iodine. The author gives the results of twenty-two months' treatment of twenty-two cases with sodium gynocardate by intravenous and intramuscular injection, and injection directly into the lesion. As much as 12 cc. of 6 per cent sodium gynocardate could be injected without ill effect. Intranodular injection hastened caseation and resorption of the leproma. Administration *per os* as a supplemental measure seemed of no value. In general the results were as follows: sodium gynocardate A effected an appreciable action on most of the cases. Cases of nodular leprosy, of less than six months' duration, benefited most by the treatment, the cure being bacteriologically as well as clinically demonstrable. A reduction of the total number of bacillary forms was noted, no alteration of the ratio of homogeneous to granular forms, such as described by Rogers, being found. Results on treatment with the esters of chaulmoogric acid are to be published later.—*Traitement de la lèpre, F. de Mello, Presse Méd., October 29, 1921, xxix, 861.*

Romberg's Classification of Chronic Pulmonary Tuberculosis.—Romberg's recent classification of pulmonary tuberculosis into exudative, proliferative and cirrhotic varieties is accepted, but the author points out that it neglects immunological conditions, which cannot be separated from, but at the same time are not identical with the anatomic variations. Very often there is no parallelism between the anatomical lesion and the reaction of the organism. Displacement of the white blood cells to the left bears a relation to allergy, but not to the anatomic lesion. The addition of "compensated and uncompensated infection" to Romberg's classification is suggested. The first would include patients with an immunebiological equilibrium; the latter those with diminution of immunity and progression of the anatomic process. The clinical findings should not be neglected with the institution of therapeutic measures.—*Über die klinische Einteilung der chronischen Lungentuberkulose, A. Meyer, Deutsch. med. Wchnschr., September 29, 1921, xlvii, 1160.*

Prevention of Tuberculosis.—With the help of Pirquet's and Hamburger's puncture reactions the spread of tuberculous infection was studied in 232 children of varying ages and economic condition, and in 72 medical students and female laboratory assistants. None of 48 children from an asylum, completely isolated from the world, had a positive reaction: while 88 per cent of those from tuberculous families gave positive reactions. Of 100 school girls, 80 per cent were found to be infected; of the 72 students and laboratory assistants, 71 reacted: 34 had a positive Pirquet, 32 showed a positive reaction to 0.1 mgm. old tuberculin, and 5 did not react until after the third injection with 1 mgm. Of 209 children of tuberculous parents, 54 died in the course of nineteen years. The

urban population in its entirety must therefore be looked upon as infected with tuberculosis. Only a small part of infected persons develops the disease. Direct transmission of the germs by coughing is necessary for infection. A single deposition of bacilli is sufficient to produce an infection. The decrease in the mortality from tuberculosis is due to improvement of general health and food, and an increase in wealth. In the struggle against tuberculosis the following measures are recommended: 1. General improvement of the health of the nation through natural immunization. 2. Separation of cases with open tuberculosis from families containing nursing and small children. 3. Improvement of the constitution of infected children. 4. Proper treatment of children after manifestation of the disease, since these cases are mostly curable. They should be treated in sanatoria, which for a great part are at present populated with incurable cases. 5. Increase of resistance in adults by improvement of food which is the best means of preventing the outbreak of the disease.—*Die tuberkulöse Durchseuchung der städtischen Bevölkerung und ihre Bedeutung für die Tuberkulosebekampfung, H. Selter, Deutsch. med. Wchnschr., February 3, 1921. xlvii, 117.*

Epidemiology of Human Tuberculosis.—This study was carried out in an isolated agricultural village in Wales, where four cases of tuberculosis have been notified since 1912. The population was subjected to Pirquet tests, old tuberculin being used. The cattle in the village were also given tuberculin tests. Altogether, the Pirquet test was applied to 117 cases in 31 families. In 8 families all members reacted positively; in 28 some were positive and others negative; in 3 families the test was entirely negative. It is shown that tuberculosis in the village spread from two main foci in the first group and that from this group the existing cases of disease had their origin. The disease spread in the family, causing active disease, and also infected strangers or relatives who came in less intimate contact with the infecting persons but did not produce open tuberculosis in them. In the second group of mixed reactors many of the offspring presented a negative reaction whereas the parents reacted positively. This leads to the conclusion that the parents have gone through an infection but that it has merely led to immunization. It also appears that the Pirquet is a reaction of immunity. Should the parents have been infectious they would have infected their children, as in the families of the first group where there are entire families with positive reactions; irrespective of age, associated with open disease in one member of the said families. From this it is concluded that the condition *sine qua non* for infectivity in tuberculosis is the existence of open foci in the lungs. The discovery of a negative reaction in a large number of families is to be attributed to actual absence of disease and to the isolation to which these farm people are inclined. In the village there is no surgical tuberculosis or lupus; this may have some connection with the finding that no bovine types of bacilli were isolated. Of all accessory factors for the spread of tuberculosis, overcrowding seems to be the most important. An effort has been made to ascertain the nature of the development of immunity. In order that immunity shall arise the contact must take place at intervals, only small quantities of virus being absorbed; under these circumstances the human organism mobilizes its defences and can cope with the infection. People in intermittent contact with open cases get only a Pirquet "positive," but not the active disease. But the facts brought out in this inquiry show that when the virus is taken in continually, as in the intimate contact of mother and child, then active tuberculosis arises.—*Epidemiological Studies in Human Tuberculosis, A. Distaso and A. C. Johnson, Tubercle, 1922, iii, 165.*

The Tuberculous Negro in the Southern States.—In the south where the work against tuberculosis is being extended, sufficient attention has not been given to the problem of the tuberculous negro. Any scheme that neglects this element is doomed to failure. Because of personal habits and peculiarly poor economic and hygienic conditions under which he lives, the negro is especially difficult to instruct and control. For this reason no philanthropic efforts on the part of tuberculosis leagues, individual societies or civic bodies will be successful without fundamental state laws empowering the segregation of the tuberculous negro, as well as liberal appropriations by the state, in addition to those of counties and municipalities. Isolation can best be brought about by establishing a common institution in each county, maintained by an equitable appropriation from the state, city and county. In the more sparsely settled areas, where the county would not be feasible as a unit, the congressional district could be the unit. Various phases of work, educational and otherwise could be directed from these centres.—*Tuberculosis in the Negro of the Southern States: a Suggested Means of Control, L. W. Roe, Correspondence, J. Am. M. Ass., December 31, 1921, lxxvii, 2142.*

Tuberculosis in Dublin.—The chief tuberculosis officer for Dublin, P. J. Murray, has recently issued his report for 1920. Morbidity from tuberculosis in Dublin during the past six years has diminished steadily. In 1915 there were 1543 deaths from the disease, of which 1193 were pulmonary cases. The numbers have decreased every year until in 1920 they fell to 820 and 615, respectively. The present scheme embraces a dispensary, a sanatorium and a hospital for chronic or advanced cases. Surgical tuberculosis is treated in the city hospitals and subsequently, if necessary, in convalescent homes. Murray advocates the provision of an institution for the treatment of children with pulmonary tuberculosis. He believes that the topographical and climatic conditions of Dublin have little influence on the incidence of the disease, which is much more influenced by the conditions under which the poorer inhabitants are obliged to live. He has found domiciliary treatment of less value than institutional, because of the deplorable housing conditions of many of the working people, conditions which render any attempt at isolation of no avail.—*London Letter, Med. Rec., January 7, 1922, ci, 29.*

Sanatoria and Consultation Clinics in Massachusetts.—The newer municipal and county institutions in Massachusetts are equipped, not only to care for ambulatory cases, but also for the humane hospital care of the bed case. Lately the policy of limiting the stay of patients in sanatoria has become more widely effective in order to help avoid delay in admitting early cases for treatment. This policy accomplishes the greatest good for the greatest number and gives the maximum economic and social welfare return for the money spent. The idea back of the consultation clinic innovation was to see whether the resident staffs of the state sanatoria could not be made of greater service to the practitioner. Admission histories show that a possible diagnosis of pulmonary disease is made early by the attending physician in a large percentage of instances. The patient seeks confirmation of the diagnosis from the practitioners or specialists and is not convinced of the true character of the disease until signs or symptoms become unmistakable or until two or more expert opinions coincide. If the general practitioner qualifies for early differential pulmonary diagnosis he, by that very fact, has ceased to be a general man. But any alert practitioner should recognize danger signs that call for expert judgment. Consultation clinics have been established to provide such judgment without the consideration of fees.—*The Aid Which the State Offers in Control of Tuberculosis through Sanatoria and Consultation Clinics, E. R. Kelley, Boston M. & S. J., February 9, 1922, clxxxvi, 185.*

Administrative Control of Tuberculosis in England.—In Great Britain and Ireland 73,000 to 75,000 people die annually of tuberculosis. At least ten times that number are continually incapacitated by it. The incidence of the various forms of the disease are chronic phthisis, 63 per cent; tuberculous meningitis, 11 per cent; abdominal tuberculosis, 8 per cent; acute phthisis, 7 per cent; spinal tuberculosis, 2 per cent; joint tuberculosis, 1 per cent; tuberculosis of other organs and disseminated tuberculosis, 8 per cent. Minor forms cannot be estimated. The practical points in administrative control are (1) care of dying cases, (2) care of the less seriously affected, and (3) general preventive measures. If 75,000 die of tuberculosis in Great Britain and Ireland in one year, 50 per cent of that number of beds are required for advanced and dying cases; for the three countries there are actually only 21,520 beds. Four forms of institutions for these cases are favored: (1) small nursing homes accommodating 25 to 35 patients in or near cities or towns to which the patients belong; (2) adjuncts to fever hospitals and infirmaries where other infective conditions are dealth with; such are suitable for careless and dirty patients; (3) ordinary sanatoria; and (4) a form of penal institution for refractory cases. For patients, not hopelessly diseased, the best form of treatment is afforded in sanatoria with some form of occupational training for suitable cases. Physicians should be encouraged to send patients to a sanatorium as soon as the disease is discovered and the patients should be kept there as long as they show favorable progress,—two or three or more years. The time spent is not lost nor is it monotonous. When progress is not satisfactory the patient should be transferred to another sanatorium. Provision should be made for the dependents of these patients, and a plan to subsidize or to give allowances to the families is favored. A committee should be empowered to certify and compel institutional treatment when the patient refuses it. Indications are that the government is prepared to establish 10 village settlements in various parts of the country, each to accommodate from 200 to 250, at an estimated cost of £1,000,000. This sum is inadequate. Such village settlements are disapproved for the following reasons: they are an untried experiment; they are a side issue and are likely to divert

effective efforts from proved and proper lines; they are too expensive; they are intended for patients with arrested disease who want to get away from such an environment; they favor the marriage of tuberculous couples and the propagation of individuals with a low degree of immunity; they do not take cognizance of the fact that tuberculous patients have a short expectation of life. Only 15 per cent of such patients are alive after five years, and 50 per cent of those with supposedly arrested disease die within five years. The plan does not consider the future of the family after the tuberculous member dies. General preventive measures should include improvement of housing conditions and methods of food production, especially of milk, butter and cheese, facilities for the masses of the people to live on the outskirts of the city and improvement in working hours and conditions. Everything likely to raise the standard of life, physical and mental, may be calculated to lead to a fall in the death rate from tuberculosis by raising the resistance of the individual.—*The Administrative Control of Tuberculosis, J. Crocket, J. State Med., December, 1921, xxix, 323.*

Civic Control of Tuberculosis in England.—Any scheme of tuberculosis prophylaxis should include the control of the food supply. In many large English towns inspection of cattle has been carried out, but many tuberculous animals have been passed to other localities before inspectors have had time to act. The only satisfactory method of dealing with tuberculosis in the milk supply is to establish a scheme which is compulsory throughout the whole country and under which every milk cow shall be periodically inspected by a qualified veterinary inspector, tuberculin tests properly applied to every animal and, where tuberculosis is found, the animal slaughtered and disposed of properly. It is not always necessary to condemn the whole carcass. A properly controlled scheme of compensation for the owner is necessary. It is essential also to have an adequate food supply, especially of fats, for the population. Housing conditions must be considered, but it is emphasized that bad housing in itself is not a prime cause of tuberculosis; the greatest number of cases of tuberculosis occurs in the male sex and yet the women are the ones who spend almost their entire lives in houses. Along with bad housing goes a group of economic conditions that are an important part of the problem. These include low wages, long hours, overwork, alcoholism, poverty, ignorance and squalor. Slums must be cleared, and well ventilated and lighted houses, factories and schools constructed. To insure adequate treatment for patients, dispensaries, sanatoria and hospitals for advanced cases should be more numerous. Probably the most important work, of tuberculosis officers in dispensaries is the examination and close supervision of contacts. For physically backward children and young people a variety of "preventoria" is essential. A maintenance grant for the family during the patient's treatment should be provided and there is need for proper provision for the post-sanatorium existence of the patient and his family. Village settlements like the Papworth colony, when fully developed, should lead to a gratifying degree of success.—*Civic Control of Tuberculosis, R. V. Clark, J. State Med., December, 1921, xxix, 372.*

Antituberculosis Work in the County of Lancaster, England.—The population covered by the Tuberculosis Scheme of the Lancashire County Council numbers 1,746,418 and at the end of 1920 there were 9,007 known cases of tuberculosis under the supervision of the dispensary, medical and nursing staffs, 7,225 of whom had formally applied to the council for treatment. The county is divided into 5 large dispensary areas and 2 subareas, each under the charge of a consultant tuberculosis officer with assistant officers, and at his chief dispensary a laboratory, in some cases an X-ray apparatus and an office and clerical staff. There are also 30 tuberculosis health visitors working from 22 dispensaries. At the dispensaries consideration is given to diagnosis and special forms of treatment, close cooperation being maintained with the practitioner. Attention is also given to housing conditions of patients, with the result that very few new cases of disease appear in such households. During the war, the death rate was 1.07 per thousand of population; in 1920 it was 0.76. The percentage of nonnotified fatal cases is declining appreciably. Of new patients applying for treatment in 1920, 19.9 per cent were third stage cases and only 33.4 per cent were in the first stage. These figures are less favorable than in 1918–1919, and the difference is solely among males, apparently due to cessation of universal medical examination of adult males during the war. There are 9 voluntary care committees in the county. Patients requiring isolation are accommodated as far as possible in nearby pulmonary hospitals where the tuberculosis officers are permitted to make visits. Highly infectious cases may be kept here for long periods and more favorable cases may be transferred to sana-

toria.—*The Prevention and Treatment of Tuberculosis in the Administrative County of Lancaster. G. L. Cox, Brit. J. Tuberc., January, 1922, xvi, 13.*

The Surgical Tuberculosis Officer in England.—France was the first country to recognize the advantages of the adoption of special means for the treatment of so called surgical forms of tuberculosis and state supported hospitals for this purpose have been in existence for many years. In 1908 the first special hospital in Great Britain for "surgical" tuberculosis in children was started at Alton, in Hampshire, and in 1916 the King Edward VII Memorial Hospital for children with osseous tuberculosis was opened by the Sheffield corporation. In order to give proper care to patients who could not be accommodated adequately in the institution, the superintendent of the hospital was also appointed surgical tuberculosis officer for the city. One aim is to coöperate closely with general practitioners and surgeons. Patients requiring immediate treatment at the time of examination are admitted to beds in special hospitals or if this is not possible, means are taken to relieve pain and to prevent deformity and complications. Some can be kept in bed at home and others treated as outpatients. Discharged cases are kept under necessary supervision and in some instances the nurse visits the home. Suitable employment is obtained for many. It is important to have services of an adequate number of specially trained nurses. In Sheffield, women health inspectors are employed; these are fully trained nurses who have served a term of six months' training in the special work at the King Edward VII Hospital.—*The Services of the Surgical Tuberculosis Officer, C. L. Pattison, Brit. J. Tuberc., January, 1922, xvi, 17.*

Antituberculosis Organization in France.—Since the war antituberculosis agencies in France have become better coördinated. The National Committee of Defence against Tuberculosis does not create or manage organizations against tuberculosis, but fosters their development and activities. There are departmental organizations in all but 16 departments. Their purpose is to coördinate local activities, apportion appropriations and look after the administration of various antituberculosis organizations. Before the war there were only 46 dispensaries in France; to-day there are 425 dispensaries, 200 of which have visiting nurses. The dispensaries are provided with a medical and a social service. There are eight schools for visiting nurses. For children there are 57 preventoriums with 3,708 beds. Other children are placed with healthy families in the country. There are 4 institutions accommodating 300 children who have been removed from sources of infection. There are in France 71 tuberculosis sanatoriums, with 6,137 beds, 8 schools for professional reëducation with 605 beds, 14 hospitals for consumptives with 2,884 beds and 28 isolation wards in hospitals with 3,942 beds. Along the French coast there are 44 marine sanatoriums, having 8,148 beds particularly intended for children with surgical forms of tuberculosis. The army medical service has 5 hospitals with 666 beds for consumptive soldiers and 8 hospitals with 731 beds for cases of surgical tuberculosis; the navy has 300 beds in 3 hospitals. Altogether, there are 214 institutions with 27,515 beds, without mentioning the resources represented by the placing-out schemes.—*The Organization Against Tuberculosis in France, L. Bernard and G. Poix, Tubercle, 1922, iii,* 159.

Relation of Euthenics and Eugenics to Tuberculosis Problem.—Prenatal tuberculous infection of the fetus through the placental circulation from a diseased mother is rare, only 60 such cases being reported in forty years. In reviewing the modes of postnatal infection special attention has been given recently to "healthy carriers of tuberculosis." Among the general population there are cases of the disease, that are unrecognized or not manifest, providing a source for wide dissemination of bacilli; this factor must be recognized in any scheme of prevention. In spite of all that has been accomplished in the last twenty-five years the incidence of and mortality from tuberculosis is still high, especially between the ages of eighteen and thirty-five, when marriages are mostly frequently contracted and children most frequently conceived. It is at this point that eugenics should be considered for, while inherited infection is rare, it is known that the child is more often found tuberculous when the mother is the tuberculous patient. The factor of close contact with the child does not wholly explain this and there is convincing evidence that the primary cause of the tuberculous predisposition is a mingling of the blood in the maternal and fetal circulation. The fact that alcohol previously consumed by the mother can be found in the new born child is sufficient to justify the conclusion that tuberculous toxins may gain access to the fetal circulation. Karl Pearson believes that hereditary influences aid in transforming tuberculous infection into actual disease. Of 3,764,101 men examined in the recent

draft 338,241 were actually tuberculous, suspected of tuberculosis or by reason of their physical defects predisposed to the disease; and there is reason to suppose that a similar condition obtains among women of the same age period. To remedy this appalling condition general hygienic measures must be applied more broadly, public health laws must be perfected, and the medical profession must be trusted and aided in its efforts to control epidemics and enforce preventive rules. There should be an obligatory examination for tuberculosis of all individuals wishing to enter wedlock, so that if they happen to be tuberculosis carriers, transmission of the predisposition to their children or postnatal infection may be avoided by careful instruction and guidance. There should be at least one annual examination of such persons as nurses and food handlers. The public should be taught that a tuberculosis carrier, instructed and conscientious and careful with the disposal of his secretions, is perfectly safe to associate with; and even marriage may be permitted. The danger of multiple pregnancies to the tuberculous mother and her children necessitates, for the ultimate solution of the problem, the inauguration of judicious, humane and scientific birth control. Civil officers, ministers and magistrates should aid by instructing couples contracting marriage. Emerson, while health commissioner of New York, gave as his opinion that "wherever the patient's health might be jeopardized by the unavoidable risks and strains of pregnancy, such patients may, according to my understanding of the law, be informed as to how to avoid conception." Without birth control we will not prevent tuberculosis and, further, the number of insane, mentally deficient, syphilitics and criminals will not decrease.—*Eugenics and Euthenics in their Relation to the Tuberculosis Problem, S. A. Knopf, Med. Rec., December 31, 1921, c. 1151.*

Tuberculosis and Prostitution.—In lay circles and fiction the prostitute is often looked on as foredoomed to pulmonary consumption, largely perhaps because of the hollow cough sometimes heard in those who have become habitual street walkers. There are, of course, other possible causes of cough, such as exposure to inclement weather, the abuse of cigarettes and alcohol, etc. Doubtless there is statistical backing for the alleged frequency of tuberculosis among prostitutes, but in order to make of it a true occupational disease it would be necessary to show that it accompanied prostitution universally. Quite recently Samson (quoted in *La Presse Médicale* of December 14, 1921, xxix, 100) reports having examined 1,300 of these women in Berlin for evidences of the disease and found about 10 per cent with active tuberculosis, about half of these being open cases. Of the 130 active cases, two-thirds were in the first stage and the balance in the second stage. The women were chiefly between the ages of twenty and thirty years and the period of prostitution was less than ten years for the oldest habituées. This 10 per cent of cases, numerically small, is regarded as high, but no control figures for other women of the same age period are given. Among the numerous factors favoring the development of the disease are the venereal diseases, the insanitary life and natural hardships of the calling, sexual excesses, the danger of transmission from men, etc. Strange to state, there was no evidence that alcohol played any serious rôle, for the majority of these women were temperate in that respect. Naturally, if present, alcoholism would be an unfavorable causal element. There was no evidence that the syphilis which they nearly all had had exerted an unfavorable influence in precipitating the outbreak of phthisis.—*Editorial note, Med. Rec., January 28, 1922, ci, 158.*

Tuberculosis Schools for United States Public Health Service Physicians.—The tuberculosis schools for medical officers in soldier hospitals and examining stations which were established some 18 months ago by the United States Public Health Service and were recently taken over by the Veterans' Bureau have trained several hundred Service physicians, four-fifths of whom have qualified in making special examinations of the chest and in reporting thereon with accuracy satisfactory to the somewhat exacting requirements of the Rating Board of the Veterans' Bureau. This has lessened the expenses for travel and the inconvenience and hazard to tuberculous veterans in going long distances to chest specialists and has more than balanced the cost of the schooling. These schools were established in the spring of 1920 in various parts of the United States. Courses of instruction were arranged and the students were chosen from among the medical officers and specialists in the service of the United States Public Health Service. In the Eighth District alone, which comprises the states of Illinois, Michigan, and Wisconsin, and where more than 150 physicians were trained, seven such courses were conducted—three at Springfield, Ill., two at Muridale Sanatorium, Wauwatosa, Wis., and two at the Michigan State Sanatorium at Howell. The broad benefits of the courses having become apparent, it was then thought

advisable to concentrate the efforts and combine the staff of the three original schools into one school and to conduct it at Chicago, where the district office of the bureau was located. Four very intensive seven day courses were conducted there. The course embraced instruction in topography, inspection, palpation, percussion and auscultation, demonstrations of the normal chest, chest pathology, and finally a study of advanced cases in hospitals. The classes were divided into small sections for individual instruction under specialists, who guided each student through the steps of diagnosis, and taught him to visualize the conditions accountable for the physical findings. A review with quizzes was then conducted, thoroughly fixing each point in the minds of the members of the class, followed by special instruction in differential diagnosis and clinics. No member of the class was allowed to leave without learning individually to differentiate different breath sounds, voice conductivity, and kinds of râles, or without a mechanical and clinical knowledge concerning them. A lecture and clinic on the heart, and a short course in X-ray and laboratory work were also given, and cinema diagnostic films were exhibited. The latest course was held at Chicago during the week of December 5–11, 1921.—*Bulletin, United States Public Health Service.*

Physicians and Tuberculous Soldiers.—From March, 1919, to May, 1921, the United States Public Health Service gave hospital care to 133,716 ex-service men, of which number 35,150 were tuberculous; many of the cases were cared for in contract hospitals. The work, especially with the tuberculous, has been done under heavy handicaps, such as (1) an untrained medical staff; (2) a great lack of coöperation from the patients; and (3) the failure of the public and volunteer organizations (and American Legion) to grasp the nature of the problem. Civilian medical men will have a large responsibility in this work as it continues, but the shortage of doctors and nurses trained to care for the tuberculous is serious. The education in tuberculosis of undergraduates and graduates in medicine is tremendously important, as is also the education, by local physician and specialist, of the general public. Many lay people in all walks of life are seeking information on tuberculosis, and the physician must meet their demand adequately, for a better lay knowledge will establish a basis for cooperation from the public respecting the returned tuberculous patient, ex-soldier or not.—*The Medical Profession and the Tuberculous Ex-service Patient, C. M. Montgomery, Public Health Reports, United States Public Health Service, December 2, 1921, xxxvi, 2938.*

Public Health Service Instruction on Tuberculosis.—Intensive seven day courses of instruction to physicians in the United States Public Health Service have been given periodically in one district of the Service. The courses embrace a review of methods of physical diagnosis and their practice on patients, quizzes on required reading, moving pictures on the diagnosis of pulmonary tuberculosis, X-ray and laboratory diagnosis, and discussion of the treatment of tuberculosis. Emphasis is placed upon history taking, and students must present complete reports of a given number of cases of ex-soldiers applying for compensation. In the three courses so far offered 150 have registered.—*Courses on the Care of Tuberculous Patients, W. C. Witte and W. H. Watterson, Public Health Reports, United States Public Health Service, December 2, 1921, xxxvi, 2935.*

Hypotheses Concerning the Etiology and Epidemiology of Tuberculosis.—In common with other forms of vegetable life the development of the tubercle bacillus is checked by cold, aridity of soil and sunshine, and is favored by warm, shaded and moist surroundings. So, in a hot, dry climate, like West Australia, tuberculosis is less malignant. Similarly, the bacillus is capable of periodical enhancement of virulence, just as in Australia large areas of country are periodically invaded by Scotch thistles. The author believes that the European influenza epidemics of 1918–1919 were in reality epidemics of tuberculosis and that similar epidemics of slight virulence occur in West Australia during the long, hot summers. In the quarrying industries, the hard dust causes in the miners a respiratory catarrh that lowers resistance to tuberculosis and miner's phthisis develops. In either case the disease is mild, probably because the arid surroundings render the tubercle bacillus less virulent. The rearing of infants on artificial and soft foods predisposes to tuberculosis because such feeding leads to adenoid trouble, poor development of teeth and jaws and a laterally compressed nose with weak cartilages. Because of the prevalence of bovine tuberculosis there is only one time in life when a man should drink milk and that is when he is too feeble to be capable of anything better. Tuberculosis has never been brought on by drinking alcoholic liquors. Beer and wine may be beneficial in increasing the tendency to fibrosis, as is often seen in tuberculous

patients who are gouty also. Alcohol is deleterious only when it stimulates the patient to undue exertion. Poor people may be more exposed to infection, but they are more resistant because they are provided with more stalwart noses, whereas a pampered child, nourished with soft food, is more liable to succumb to the disease.—*Tuberculosis: Its Climatology and Sociology, O. Paget, Med. Rec., December 10, 1921, c, 1026.*

Etiology, Prevention and Treatment of Phthisis.—The complete biology of the tubercle bacillus has not yet been worked out; and there are reasons to believe that it may be derived from a saprophyte, probably a member of the streptothrix group of hyphomycetes or mould fungi, from which its present parasitic form has been evolved in the animal body. A certain degree of epidemic influence in the etiology of phthisis must apparently be reckoned with. The question of heredity in the etiology of phthisis is an old controversy. Powell places himself with those who, regarding heredity as a structural vulnerability to a specific infection, hold the soil as well as the seed to be of importance in fertilization. A large proportion of the relative excess of mortality amongst middle aged people is traceable to the conditions of the industries which are mainly worked by persons within this period of life. General sanitary, hygienic, dietetic, symptomatic and tuberculin treatment is discussed.—*The Etiology, Prevention, and Treatment of Phthisis, R. D. Powell, Practitioner, January, 1922, cviii, 1.*

Droplet Infection.—*Dissemination, number, and content of droplets:* The proper disposal of tuberculous sputum has been overemphasized, to the disadvantage of an important avenue of spread of the disease, namely, droplet infection. This phase of spread of the disease was studied by placing a frame containing microscope slides at an angle of 45° from the surface of a table, so that the distance from the mouth of the person coughing was from 20 to 80 cm. These slides were stained with anilin dyes. The shapes of the droplets were mostly round or oval. Some contained no organized material; others, leucocytes and epithelial cells; while many contained bacteria. The size of the droplets varied between 20 and 3000 microns. The largest drops were on the centrally placed slides. A distinction must be made between bronchial droplets, containing no epithelial cells, and no bacteria except often tubercle bacilli and pus cells; and mouth droplets, containing oral epithelium and mouth organisms, and tubercle bacilli only when sputum masses are retained in the mouth previous to coughing. The mouth droplets are larger than those from the bronchi and are not cast as far as the latter. Only the bronchial droplets are of importance in the spread of tuberculosis. Often both kinds of droplets are seen on the slides at the same time. Loud speaking causes the emission of mouth droplets amounting from 40 to 1000 in half an hour; bronchial droplets are emitted only upon coughing. During 20 coughs from 100 to 8000 such droplets are thrown out. Whether tubercle bacilli are contained in the droplets varies with different patients. Some throw out tubercle bacilli constantly, others only occasionally. The time of the day also makes a difference, for more droplets are emitted early in the morning than in the afternoon. The average number of tubercle bacilli delivered in the droplets in thirty minutes amounts to 100, in a good number of cases 200 to 400, rarely as high as 20,000. On the average, one can say that some 2000 tubercle bacilli are cast out into his environment by a patient through bronchial droplets in twenty-four hours. *Infectivity of droplets:* The avenues whereby these droplets may reach and infect a healthy individual are (1) direct contact with the droplets, usually by the fingers and carrying them to the mucous membrane of the nose or mouth; (2) inhalation of dust or dust-like particles of various kinds which have been sprayed with the infectious droplets and later dried; and (3) inhalation of the fresh droplets while these are still in the air immediately after expulsion. Until recently, the direct inhalation of fresh droplets containing tubercle bacilli as a factor in the production of pulmonary tuberculosis was not considered of great moment. Recent experimental work with guinea pigs by Chaussé and by Hippke seems to show that this is an important avenue for the spread of pulmonary tuberculosis. The comparative importance of the above three modes of infection is extensively discussed. *Prophylaxis:* The simplest measure consists in assuring a certain minimum distance between the tuberculous and the well individual. Very few droplets were found on the slides at a distance of 24 inches, with 32 inches as the extreme limit at which droplets were found. Droplets are sprayed this distance only during coughing. Persons not infrequently are closer to each other than the above distances, especially in street cars, workshops, streets and theatres. In the case of a mother nursing or caring for her child the distance is no more than 10 to 15 inches. Hence, it is necessary that in

association with the tuberculous the distance between persons should be at least arm's length, especially during coughing spells. Likewise, it is desirable that the head of the well person as well as that of tuberculous be averted during the act of coughing. The cougher should place his handerchief or at least his hand in front of his mouth during cough. It is more desirable to use squares of gauze or linen that can be burned than handerchiefs, to be held before the mouth.—*Die Bedeutung der Verstreuung von Hustentröpfchen für die Verbreitung der Phthise, C. Flügge, Zeitschr. f. Tuberk., May, 1921, xxxiv, 212.*

Droplet Infection.—Of 14 animals, sitting separately in boxes and exposed to coughing consumptives for five to thirty minutes, 10, including those exposed only five minutes, developed tuberculosis, originating definitely in the lungs in 7 of them. Of 7 animals not confined to boxes at first only one was infected in the eye; upon repetition of the experiment with patients having abundant bacilli, all animals were taken ill with severe tuberculosis. The frequency and intensity of infection by scattered droplets was studied on patients from several sanatoria and welfare centres. In accordance with Niesché's figures 40 per cent of the examined patients showed spread of infection by means of droplets. Acute bronchitis increases the opportunity for spread of infection. Isolation of patients scattering more than 20 droplets on 3 slides at a distance of 40 cm. is recommended as an effective measure in combating tuberculosis.—*Über Infektion durch Hustentröpfchen von Phthisikern, E. Hippke, Deutsch. med. Wchnschr., May 12, 1921, xlvii, 528.*

Droplet Infection.—Guinea pigs were exposed to the coughing spray from open cases of pulmonary tuberculosis. Some animals were directly exposed, while others were placed in wooden boxes just large enough so as not to cramp them. In the middle of one of the walls a circular opening of 4 cm. diameter was made, into which was fitted a 3 cm. tin tube which, as it receded from the box, became more conical, with a maximum diameter of 4.5 cm. With this tin tube, by means of a rubber collar, was connected a glass tube 4.5 cm. in diameter, forming a movable joint. The free end of the glass tubing was held close to the patient's mouth while coughing. The guinea pig was placed with its head facing the 4 cm. aperture, and 2.5 cm. back of the aperture, being held in this position by a holder. The distance between the patient's mouth and the animals nose was 22 cm. when the former was in direct contact with the glass tube. In the lower portion of the posterior wall of the box another circular opening of 4 cm. diameter was made, to permit of the exit of "coughed-in" air. The guinea pigs exposed directly to the coughing were placed in brass tubes of 7 cm. diameter and 16 cm. in length, closed at one end. At the end to which the mouth of the patient was applied, when coughing, the tube was covered with a wide mesh wire which increased the total length of the tube by 5 cm. After use the boxes were disinfected with 10 per cent bichloride of mercury solution, the glass tubes were disinfected by dry heat and the metal tubes were autoclaved. Initially, microscopic slides instead of animals were placed in the boxes; and after coughing into the latter the slides were stained and some of the droplets were found to contain tubercle bacilli. When only such patients were chosen, who had few bacilli in the droplets, all of the results were negative. Ten attempts were made with 8 patients, all of whom showed tubercle bacilli in the droplets in greater or smaller numbers. The animals were exposed for varying lengths of time (5 to 75 minutes). All developed tuberculosis. It was thus found that of 587 sanatorium patients coughing on the tray, only a few (43 or 7.3 per cent) ejected tubercle bacilli: but when they coughed for one to three days, for the duration of 1 hour daily, 38.6 per cent ejected tubercle bacilli. Of 18 other patients, 44.4 per cent ejected tubercle bacilli. In one institution as high as 51.8 per cent of patients showed tubercle bacilli in the droplets.—*Neue Versuche über die Bedeutung der Tröpfcheninfektion für die Ausbreitung der Lungenschwindsucht, E. Hippke, Ztschr. f. Hyg., July, 1921, xciii, 122.*

Family Infection.—The children of twenty-eight families, one member of which had tuberculosis in varying degree of severity, were studied; and an attempt was made by means of the tuberculin reaction to determine the frequency of infection. As a first test, the Moro percutaneous reaction with concentrated tuberculin was employed; a negative result was checked with the administration of 0.1 cc. O. T. subcutaneously; if still negative the dosage was continued until 1 mgm. had been given. The sputum carriers were investigated and were divided into three classes, (1) those who constantly expectorated large numbers of bacilli, (2) those showing an occasional positive sputum, and (3) those in whom no bacilli could be found by repeated examinations and animal inoculation. The following conclusions were drawn: 1. Patients con-

stantly expectorating bacilli infect all their children, of whom (a) only infants fail to react during their first years, in spite of frequent opportunities for infection, and (b) if these prove to be infected they are all brothers and sisters. 2. Pulmonary patients with expectoration, but with only occasional bacilli, are much less dangerous to the members of their families. 3. Bacillus-free patients are not a source of infection. 4. Bacillus-free patients, who nevertheless have severe clinical pulmonary tuberculosis, and who at times have bloody expectoration, should be considered as "facultative open" (Winkler) and are dangerous to their families in the highest degree. 5. Small children over one year are unquestionably infected by ample and repeated opportunities for such infection. These children often become ill at the first infection and show a high mortality. 6. Small children in contact with patients who occasionally expectorate a few bacilli do not show as great a tendency to tuberculous disease. 7. Children over two years of age, in spite of abundant opportunities for infection, seldom become sick, and their mortality is correspondingly limited (Pollak). 8. Children of parents whose sputum contains great numbers of bacilli are in a permanent state of hypersensitiveness to tuberculin because of continuous reinfection.—*Unmittlebare Beobachtungen über Tbk.-Infektion in der Familie, T. Köffler, Münch. med. Wchnschr., September 16, 1921, lxviii, 1172.*

Familial and Inherited Incidence of Tuberculosis.—The mortality among the offspring of tuberculous parents is greater than among those from healthy parents, thus indicating a familial occurrence of tuberculosis. What rôle inheritance, or the "lasting" slight association with the diseased, can play is not known. Since the anatomic changes produced during life by the bacilli cannot be inherited, only the inheritance of the property of an increased disposition to the disease can be worthy of consideration. This increased disposition to tuberculosis can rest upon anatomical, biochemical and functional deviations. The different disposition factors are discussed, and it is determined that some of these are inherited; for instance, thorax abnormalities, constitutional peculiarities, abnormalities of the circulatory system, various diatheses, chemical changes in the organism, sympathetic and vagotonic states, orthostatic albuminuria, etc. The more common these properties in the ancestry of an individual and the more these have been inherited, the worse is the outlook with regard to the development of a manifest tuberculosis from an infection. A rational combat against tuberculosis must as far as possible aim to exclude from the individual all those circumstances that tend to increase the disposition to the disease. An influence can be brought to play upon the combination of hereditary factors only when it has been determined whether a greater susceptibility to tuberculosis can be inherited and whether this is associated with determinable conditions.—*Über familiäres und erbliches Vorkommen der Tuberkulose, H. Schut, Beitr. z. Klin. d. Tuberk., January 10, 1921, xlvi, 227.*

Conjugal Tuberculosis.—At the Grefsen Sanatorium, Norway, a study was made of 3151 patients treated between 1911 and 1920, inclusive. Of these, 1,152 were married and among them there were 85, or 7.4 per cent, whose consorts were also tuberculous. In 13 of these 85 cases there was a history of childhood exposure to infection, leaving 72 in which it could be assumed that the infection was conveyed from one consort to the other. The sex distribution was exactly equal, 36 husbands and 36 wives having been assumed to be the sources of infection. There were 94 widows and widowers and 44 of these, or 47 per cent, had had consorts who had died of tuberculosis. In 69.3 per cent of the cases the disease broke out within two years of the time at which infection may have been supposed to occur; in the others there were longer latent periods. These investigations seem to point definitely to the reality of the dangers of infection in adult life. However important in many cases infection in childhood may prove to be in relation to the subsequent outbreak of tuberculosis in adult life, this other teaching cannot be dismissed.—*Conjugal Tuberculosis, Sofie Tillisch, Tubercle, March, 1922, iii, 256.*

Tuberculosis and Pregnancy.—During the period of pregnancy or *post partum*, for some unexplained reason, either the progress of the disease is stimulated, or the protective mechanisms of the body are reduced to a minimum. Among the possible explanations are the increased demand for lime salts by the foetus during the later stages of development, which diverts the calcium from the healing lung foci and allows lesions which might otherwise calcify to become progressive. Likewise, hormones secreted by the ovaries have a relaxing effect upon the connective tissues, not only in the pelvis but also upon those of the whole body, so that fibrous foci are rendered permeable and metastasis can occur. Two practical problems present themselves to

the physician in the treatment of such cases: 1. When is one justified or compelled to terminate the course of pregnancy during tuberculosis? 2. How should the pregnancy be interrupted? In answering the first question the following facts must be taken into consideration. Eighty per cent of cases with latent respiratory tuberculosis go through a pregnancy without an activation of disease. Activation occurs during pregnancy in 10 per cent of cases, and in 20 per cent during pregnancy and the puerperium combined. The same applies to cases of pulmonary tuberculosis in the Turban I classification, although repeated pregnancies may result fatally even at this stage. The second and third month are especially dangerous. In stage Turban II, extension occurs in 80 per cent of the cases, but termination of the pregnancy will result in improvement in 80 or 90 per cent of the cases. In the first stage of pulmonary lesion, dilatation and curettage is the proper method for terminating the pregnancy, which is best done during the fourth or the sixth month. In the second stage of pulmonary disease complete extirpation of the pregnant uterus, together with the adnexa, is the operation of choice. To avoid the dangers of an inhalation narcosis sacral anaesthesia should be used. Such treatment prevents the occurrence of future pregnancies, and furthermore the removal of the ovaries will cause an increase in the fat deposits of the body. During the third stage of tuberculosis operative procedures are dangerous and sanatorium treatment alone is available.—*Über Tuberkulose und Schwangerschaft, E. Kehrer, Münch. med. Wchnschr., September 16, 1921, lxviii, 1171.*

Tuberculosis and Pregnancy.—Conclusions are based on observations of 164 tuberculous women received in the author's practice during the first six months of 1921. In 31, or 18 per cent, the development of tuberculosis was associated with pregnancy. In 19 of these the tuberculosis made its first appearance with the pregnancy, the disease becoming apparent during the course of gestation in 6, and after delivery in 13. In 12 a known tuberculosis was aggravated by the pregnancy, the flareup occurring during the gestation in eight cases and after delivery in four. The conclusion was that developing tuberculosis is most likely to light up with accouchement, while a manifest tuberculosis is likely to be aggravated in the course of gestation. It is emphasized that in localized, fibrotic forms of tuberculosis pregnancy may lead to no unfavorable result whatsoever. Consequently the type of tuberculosis should be determined before interruption of pregnancy is advised.—*Gestation et tuberculose, L. Bernard, Presse Méd., November 16, 1921, No. 92,909.*

Malnutrition as a Cause of Tuberculosis.—Tuberculosis is due in the final analysis to the failure of nutrition. Inefficiency of the digestive function produces an impoverishment of the blood and tissues, and the lungs, being overworked and undernourished, become susceptible to the toxins of tuberculosis. Other factors may play a part, but the importance of suitable and sufficient food has been underestimated. The effect of malnutrition in the parent may be to render the child more susceptible to ill health and it is important therefore to educate future parents in the fundamentals of hygienic living. The eradication of tuberculosis will be hastened if the gastro-intestinal function of every individual is given proper attention. Among other things, alcoholic beverages and tobacco in any form directly contribute to the causation of tuberculosis and to the progression of the established lesion. There is no longer any excuse for the physician to tell the tuberculous patient that he is suffering only from a bronchial condition, when it is known that ignorance and carelessness kill so many. If our children were taught in school what patients go to sanatoria to learn, there would be less need for sanatoria. It should also be realized that a slight hemorrhage, not harmful in itself, may be acutally beneficial in impressing the patient with the necessity for caution.—*Tuberculosis a Disease of Malnutrition, E. H. Cleveland, Med. Rec., February 4, 1922, ci, 185.*

Dust in Printers' Workrooms.—Is there a relation between tuberculosis in printers and the inhalation of silica? The possible sources of silica in the printing industry are (1) sand used in moulding the metal frames in which the type is locked (some silica and oxide of iron are loosened and shaken out on releasing the type); (2) silica shaken off by vibration in machines; and (3) the "dross," the residue after type is melted down. Determinations as to the quantity of dust in the workrooms, and the nature and size of the particles of dust, were made by drawing a measured volume of air of the workroom through a weighed filter-paper and weighing the dust collected on the paper (Duckering method), and then by microscopic examination of the dust (with use of polarized light). Samples were taken from various rooms and machinery. Some of the rooms were poorly ventilated; other newer ones were equipped with modern dust-extracting systems. Relatively small

amounts of dust were found. The highest concentration of dust in the air of all the rooms was 31.7 mgm. per 10 cu.m. of air, the lowest 1, and the average 14.9 mgm. per 10 cu.m. In all the samples the proportion of silica was negligible. These results compared favorably with air examination in gardens, laboratories, etc., where the count ran from 0.7 mgm. in the garden after thirty-six hours of heavy rain to 18.5 mgm. per 10 cu.m. in the middle of the laboratory. The proportion of silica in these dust samples ran on an average very much less than the silica in house dust (taken from the top of a wardrobe) in London. *Conclusions:* 1. Printing cannot be described as a dusty trade. 2. There is very little silica in the air of printshops. Such dusts contain less silica than the dust of an ordinary living room.—*Dust in Printers' Workrooms, C. B. Roos, Jour. Industr. Hyg., 1922, iii, 257.*

Pulmonary Tuberculosis Referable to Traumatism.—So called traumatic pleuropulmonary tuberculosis is rare but it does exist. It is especially likely to follow violent thoracic injuries that arouse a latent focus that would otherwise have remained latent for an indefinite time. It is the local rather than the general effect that is responsible for the activation of the lesion. In deciding to what extent tuberculosis is attributable to an injury, it is not of great importance to determine the exact mechanism of the activation; the essential thing is to carefully investigate the patient's health previous to and immediately following the trauma and to correlate this data with that obtained from a medical examination.—*Note sur la tuberculose pleuro-pulmonaire dite traumatique, G. Brouardel and L. Giroux, Meeting, Académie de Médecine, November 8, 1921, reported in Le Prog. Méd., November 19, 1921, no. 47,450.*

Inherited Immunity in Pulmonary Tuberculosis.—The relation between the course of pulmonary tuberculosis and heredity was investigated in 76 patients. The severe cases with rapid and progressive course were found to occur to a great extent in patients from healthy families, while the benign, chronic varieties, frequently revealed an heredity of tuberculosis. Sixty-six per cent of the unfavorable and 40 per cent of the benign cases had healthy parents. These results indicate a decrease in the toxicity of the tuberculous virus by family passage.—*Über klinische Immunität bei Lungentuberkulose, R. Zimmermann, Deutsch. med. Wchnschr., November 10, 1921, xlvii, 1354.*

Childhood Infection as the Origin of Tuberculosis.—A series of charts represents graphically the author's observations on the epidemiology of tuberculosis. Most of these are constructed in his "population frame" where the factor considered in any age group is presented in relation to the fraction of total population of the same age group. The mortality curve, calculated on the basis of 3 deaths per 1000 population, shows two high points, the greater of which corresponds to the first two years of life, while the lesser, secondary wave reaches its maximum between the ages of 30 and 40; the latter however may occur 10 years earlier or 10 to 15 years later. The minimum level coincides roughly with the tenth year. In the first year the mortality is at least twice as great as in any other later age period. In infancy tuberculosis acts as an acute infectious disease and often occurs in hospitals in purely epidemic forms. Pathologically, it is comparable to inoculation tuberculosis in animals with virgin soil infection. From the fourth to the fifth year the disease changes its form, passing into the more latent stage of scrofulotuberculosis with its comparatively small mortality, due chiefly to meningitis and miliary tuberculosis. After the age period 10 to 15, the disease gradually assumes the type of chronic pulmonary tuberculosis which henceforth is the dominant cause of death. Tuberculosis mortality shows a remarkable constancy from year to year among populations of a comparatively stationary character. When the disease is first introduced into a community the mortality may be very irregular, but as soon as it has become endemic the above observation holds true. This seems to indicate that adult pulmonary tuberculosis is a secondary process, not dependent on accidental infection. Judging from the results of mass examinations made in Sweden and Finland, pulmonary tuberculosis can be demonstrated in 0.5 to 9 per cent of the population in different countries and districts, the greater number being found around the age of 30, where the figures range from 2 to 12 per cent. The clinically demonstrable morbidity may therefore be estimated at an average of 2.5 per cent of the population with a maximum of at least 5 per cent for the age of 30. Bang, among 6000 necropsies, accidentally found recent macroscopic tuberculosis in 8.5 per cent of persons who had died from accidents or other disease; Harbitz's figures showed 7.5 per cent in 1300 necropsies. Both investigators conclude that as many as 13 per cent in the age period 17 to 18 are seriously infected with tuberculosis; these figures harmonize

with the number of consumptives in this age period who we know will die of the disease. It may therefore be assumed that a large proportion of our consumptives are recruited by re-auto-infection from these cases of manifest and progressive character. Considering the morbidity of the disease in the later years of childhood, it would not be excessive to estimate purely lymphatic tuberculosis at 5.5 per cent and clinically manifest tuberculosis (all forms) at 8 to 10 per cent, with a maximum of 12 to 13 per cent of the population in the age group of 10 years. In addition there are benign and latent glandular infections, beginning in infancy and gradually becoming obsolete and inactive from as early as the middle of the first decade, to be found in about 70 per cent of persons at the age of 15. The observations of Pollack and Bergmann indicate that the primary infection of cases of clinically manifest, usually fatal tuberculosis, at any rate in the majority of cases, is traceable to the first years of life. As an average mean, 6 to 7 per cent of the population harbors a manifest, virulent, undoubtedly active tuberculosis in a more or less latent, though often clinically demonstrable form. The average duration of the disease from infection to death may be estimated at 15 to 20 years. Tuberculosis may be comparable to leprosy where there is a latent period between the initial infection and the appearance of clinical manifestations. Harbitz has shown that in many cases the continuity of tuberculosis from the lymphatic disease of childhood to the pulmonary disease of adult life may be demonstrated pathologically. In Kronoby, Finland, Tennberg performed wholesale examinations of the population in 1909 and again in 1919. In the intervening ten years an antituberculosis campaign was conducted. It was shown that the total number of cases of pulmonary tuberculosis was reduced to one-third of what it was. The decline was most rapid in the first decade, becoming less marked in later age groups until between 30 and 50 years the decline was hardly perceptible. In the later periods there was again a considerable decline. It appears therefore that it is in the early years of childhood that any direct effect of tuberculosis prophylaxis is seen. Some effect may be seen in higher ages, from 55 onward, where susceptibility to infection may again become greater. Further support of the view that most cases of phthisis developed the first phase of their disease in the first years of life is to be found in the fact that the number of children, yearly born in surroundings seriously contaminated with tuberculosis, seems to bear a definite relation to the number of tuberculous patients who yearly die of the disease. It is concluded that 80 to 90 per cent of consumptives acquire their first infections in childhood and that later manifestations depend principally on endogenous, re-auto-infections. This applies to populations where tuberculosis has been prevalent for generations. The most effective prophylaxis would be the protection of children, especially during the first three or four years of life, from the most severe infections. A further study of immunity may lead to the finding of a beneficial vaccine. Predisposing causes should be minimized or removed. Consumptives should be trained to prevent infection, especially of young children, by properly caring for their expectoration.—*Is Tuberculosis to be Regarded from the Etiological Standpoint as an Acute Disease of Childhood? K. F. Andvord, Tubercle, 1921, iii, 97.*

Relation of Adult Pulmonary Tuberculosis to Childhood Exposure to Infection.—Routine history taking showed childhood exposure to sources of infection in 62 per cent of 200 adult cases of pulmonary tuberculosis. This preponderance of childhood exposure in such cases suggests reinfection from within rather than from without. There must be many periods of mild tubercle toxemia between the date of infection and the discovery of clinical disease; and many cases of so called malnutrition, nervous instability, malaria, anemia, undetermined fever, etc., may be the result of such toxemia. After having done what we can to prevent early contact with open cases, we should employ every possible means to determine the degree of infection, especially in contact cases, in order that those showing heavy or even moderate infection may have special observation and supervision with the purpose of safeguarding the child by improving the environment and by the early recognition of symptoms and signs, should they develop.—*Direct Exposure to Tuberculosis in Infancy and Childhood and Its Relation to Manifest Pulmonary Tuberculosis in the Adult, W. M. Taylor and L. J. Moorman, Meeting Southern Med. Ass., November 14–17, 1921, reported in J. Am. M. Ass., December 24, 1921, lxxvii, 2087.*

Tuberculous Contagion in Infancy.—The source of contagion is infected man. There are two types of source: one the person with occult disease who emits bacilli intermittently and occasionally, or the person with outspoken disease to whom the healthy individual is exposed only transiently; the second, the person with outspoken disease to whom the normal

person is constantly exposed. The first supplies but few bacilli and that infrequently (which probably results in occult tuberculosis); "the second is prodigal with its germ supply," which produces well marked tuberculosis. The numbers of bacilli and their virulence are important. Such facts have been ascertained by the author and Debré from observations on newborn and very young children of tuberculous mothers. On a basis of the skin test, done at regular weekly intervals, one determined the time when infection begins; the period preceding a positive skin reaction is the incubation period or "ante-allergic" stage. In a proportion of cases the appearance of a reaction coincides exactly with a rise of temperature, and at times with digestive disorders, etc.; but often the infection remains latent for a time after the skin test has become positive. These infections are usually fatal. The lesions are almost invariably pulmonic, a large tubercle in one lobe and a caseous gland in the corresponding area, and almost never mesenteric, as reported by Woodhead in England. Sometimes other foci are found in the lungs. Child and mother are separated as soon as disease is made out in the latter. The ante-allergic stage has a duration of about two months; this is shortened when contact between mother and child has been closer. Intracardiac inoculations of animals of bacilli have established a definite relation between dosage and duration of the ante-allergic stage. If the child is separated early enough from its mother, its life can be saved. Persons with tuberculosis remain the great source of danger. But the person who emits occasional bacilli intermittently should not be avoided, because from him we get a few bacilli occasionally which serve gradually to render us immune. The ideal would be an immunizing vaccine artifically administered.—*Tuberculosis Contagion, Especially in Infancy, L. Bernard, Internat. J. Pub. Health, November–December, 1921, supplement to vol. ii, 661.*

Case of Congenital Tuberculosis.—A Mexican woman of twenty-four was diagnosed clinically as suffering from acute miliary tuberculosis. The scanty sputum at no time contained tubercle bacilli. She died when about five months pregnant. At necropsy miliary tubercles were found generally distributed, most numerous in the lungs. The uterus was markedly enlarged, soft, and congested. The fetal peritoneal cavity contained an increased amount of straw-colored liquid, smears of which were negative for tubercle bacilli. No miliary tubercles were found in the abdominal cavity. Smears of scrapings of the cut surface of the fetal liver contained occasional tubercle bacilli. Similar smears from the placenta did not reveal any tubercle bacilli. The finding of tubercle bacilli in the fetal liver establishes this as a proved case of congenital tuberculosis.—*Congenital Tuberculosis with Report of Case, G. P. Pratt, Am. J. Dis. Child., January, 1922, xxiii, 88.*

Milk Control and Tuberculosis.—The control of milk which may be infected with bovine tuberculosis is so defective in Great Britain at the present time as to afford little or no protection for milk consumers. The most stringent regulations are necessary to enable infected milk and diseased animals to be disposed of without delay.—*Milk Control and Tuberculosis, H. M. Cargin, Brit. M. J., November 26, 1921, no. 3178, 894.*

Pirquet Test as an Index of Milk Control.—Synwoldt's and Kretschmer's findings, following injection with human or bovine tuberculin, were repeated on 500 children ranging from the nursing child to those of fourteen years of age. Synwoldt's statements are confirmed by these investigations: 126 of the cases inoculated with O.T. and B.T. reacted positively. The number and intensity of the reactions to B.T. were found to be definitely increased when compared with the response to O.T. The contamination of the milk from 14 farms with bovine tubercle bacilli was found to be the cause of the above results. Sediment from these milk samples was injected intramuscularly into guinea pigs and 9 of them developed extensive tuberculosis. These findings are in accordance with those obtained by Vollert in his study on milk-supplying cattle.—*Über Zusammenhänge zwischen Pirquetscher Kutanreaction und dem Stande der örtlichen Milchhygiene, G. Stern and W. Schultz, Deutsch. med. Wchnschr., September 8, 1921, xlvii, 1066.*

Early Recognition of Active Tuberculosis in Children by the Wildbolz Reaction.—The technique followed was a modification of Wildbolz's urine reaction. The patient's urine was evaporated *in vacuo* at 50–55°C. to 1/10, or if very concentrated, to 1/8 its volume, cooled to precipitate certain salts, and filtered several times through 2 per cent phenol filter paper. Instead of injecting one or two drops of this solution intracutaneously, as advised by Wildbolz, the injection was performed subcutaneously and the result read in

forty-eight hours. The material for the study consisted of 50 children, arranged in four groups. Group 1 included 4 children free from tuberculosis and 8 infected with tuberculosis, but clinically well, all giving negative Wildbolz reactions. Group 2 consisted of 25 children with various types of active tuberculosis, and all reacted positively, the degree of reaction corresponding to the degree of activity of the tuberculous process. In group 3 were 9 children with bronchial lymph node tuberculosis, all of whom gave weak but distinctly positive reactions. Finally, the four children in group 4 all had conditions which simulated active tuberculosis, but the negative Wildbolz reaction was an important aid in establishing the true diagnosis. The reaction, therefore, would appear to be a valuable aid to the early recognition of activity in tuberculosis.—*Zur Frage des frühzeitigen Nachweises aktiver Tuberkulose bei Kindern mit Hilfe der Eigenharnreaktion nach Wildbolz, O. H. Kotzulla, Zeitschr. f. Kinderhk., April 25, 1921, xxix, 93.*

Pulmonary Roentgen Findings in Surgical Tuberculosis of Childhood.—The pulmonary, clinical and roentgenological findings are given in 6 children with surgical (bone) tuberculosis, bearing out the conception that tuberculosis is a general disease and, as such, requires more than a consideration of the surgical condition. It is also pointed out that the term "healed" in local (surgical) tuberculosis should be used less frequently, and that treatment of the patient should be discontinued only when the general disease (pulmonary process) is healed or a possible recurrence is excluded.—*Über roentgenologische Lungenbefunde bei chirurgischer Tuberkulose im Kindesalter, K. Klare, Beitr. z. Klin. d. Tuberk., January 10, 1920, xlvi, 183.*

New Sign in Childhood Tuberculosis.—Childhood tuberculosis is chiefly lymphatic. Where there are nasal obstructions, enlarged tonsils and adenoids and resulting sepsis, there may be an inflammation of the tracheal and bronchial mucosa and a corresponding enlargement of the bronchial nodes giving rise to clinical signs; such inflammation may open the way for tuberculous infection. In puerile pulmonary affections an alteration in the position of the scapula is taken as an indication of underlying disease. The mechanism is explained as follows: The healthy bronchial node on first attack becomes inflamed. Hyperstimulation from the corresponding spinal cord segment results and the scapula is drawn up, the muscles affected being those from which the scapula is slung. If this stimulus continues sufficiently long, fatigue takes place and the scapula drops. Following upon fatigue, if the condition gets worse, wasting results, and in some cases the bone, even after the disease is completely healed, never quite recovers its normal position. The resilient muscles of the child respond easily and rapidly and offer a more efficient sign than those of the adult. For the same reason the youthful muscles respond when the cause of the disturbance of tone is removed and in many cases regain their normal conditions. The whole treatment of childhood tuberculosis can be summed up in the word rest. Six case reports are appended.—*Tuberculosis in Childhood, F. S. Tinker, Tubercle, February, 1922, iii, 211.*

Epituberculous Infiltration of the Lungs in Children.—The conception of a chronic nonspecific infiltration of the lungs occurring only in tuberculous children, as described by Eliasberg and Neuland under the name of *epituberculous infiltration* (abstracted in a recent number of the AMERICAN REVIEW OF TUBERCULOSIS) constitutes a distinct advance in the classification of chronic pulmonary disorders. To show that such conditions are not rare, the clinical histories of three additional cases are given, resulting in clinical cure in one, complete regression of the process as shown at autopsy in another, and marked improvement in the third case which is still under observation. As being of some value in interpreting the possible mechanism in the production of such infiltrations, the autopsy findings in a fourth case, frankly tuberculous, are appended. In the latter, the anatomic distribution of the lesions seemed to indicate a reverse direction of the lymph stream, the infection apparently being carried from the hilum toward the periphery, and no primary lesion being found in the lung parenchyma. It is possible that further study may broaden the present conception of epituberculous infiltrations in many important respects.—*Zur Kenntnis der "epituberkulösen Infiltration," Grävinghoff, Monatschr. f. Kinderhk., August, 1921, xxi, 447.*

Surgical Treatment of Pulmonary Tuberculosis in Children.—Surgical measures in children are artificial pneumothorax and plastic operations. Indications for pneumothorax are greatly limited by the tendency in very small children to generalization of the process. The hepatizing form does not readily admit of collapse. Predominant hilum involvement is not submitted to surgical interference; for it yields

more rapidly and with less risk to general treatment. Study over many years is required to ascertain to what extent the shape and function of the thorax are affected by plastic operations.—*Chirurgische Behandlung der kindlichen Lungentuberkulose, L. Brauer, Ztschr. f. Tuberk., October, 1921, xxxiv, 647.*

Primary Tuberculosis of Skin in a Child.—On October 11, 1920, a 16-months' child, brought to the dispensary because of a recent cough, was found to have negative tuberculin tests (Pirquet, and 1 mgm. subcutaneously). The cough disappeared within a week, but the child was brought back to the dispensary January 19, 1921, because of an impetigo of three to four weeks duration. All of the lesions were typical impetigo except one ulcer situated in the posterior axillary line on the back. This was 1.5–2 cm. long, oval in shape, and showed an infiltrated, inflamed base. The regional axillary lymph nodes were swollen to the size of a hen's egg. At this time the Pirquet reaction was found to be strongly positive, although the X-ray of the chest showed only a slight, indefinite hilum shadow on the right side. All the impetigo lesions with this one exception yielded rapidly to treatment. On January 29th the child developed a typical phlyctenule in the left eye. The skin lesion was excised and showed the histological picture of a papular tuberculide. The fact that there were no other tuberculides found, that the regional lymph nodes were enlarged, and that the tuberculosis was of such short duration makes it seem quite likely that the lesion was not a tuberculide, but a primary inoculation of the skin with tubercle bacilli which found entrance through the impetigo lesion. The possibility of an aerogenous infection, however, cannot be gainsaid, as subsequent chest examinations by means of the X-ray showed slight but inconclusive changes about the hilum. Dietl says that positive reactions to injections of 1 mgm. of tuberculin may be obtained in 19–23 days after infection, whereas the cutaneous reactions after aerogenous tuberculosis become positive in five to six weeks.—*Ein Fall von Hauttuberkulose (Kutane Primärinfektion?), K. Dietl, Monatschr. f. Kinderhk., October, 1921, xxii, 27.*

Genital Tuberculosis in Male Children.—Though tuberculosis of the genital and urinary tracts is rare in children and in adults, it is probably not as uncommon as has been supposed. The difficulty lies in the fact that it may be mild, or that a spontaneous cure may be effected. At the Massachusetts General Hospital during the past fifty years, there have been a total of 11 such cases, among 401 admissions (including reëntries) for this condition, a percentage of 2.74. Concerning tuberculous epididymitis, bilaterality of this disease is far less common in children than in adults. This applies also to orchitis. In most cases it is no more necessary to remove the testicle of a child than that of an adult. The testicular internal secretion is so important during puberty that removal of a child's testis should be done only as a last resort. In adults, the formation of a scrotal abscess with spontaneous rupture and the establishment of a fistula occur in over 76 per cent of adult cases. In the 11 children under discussion it occurred only three times. Involvement of the vas was noted twice. There is no reason to believe that such involvement is rarer in children than in adults. Five out of 6 patients are known to have had no demonstrable lesion of prostate or seminal vesicles. Such lesions are most frequent during the time of greatest activity of these organs, that is, after puberty. Renal tuberculosis complicating the genital disease is very rare in childhood, but not uncommon in adults. Undoubtedly the original focus is in the lung or the bronchial lymph nodes. The frequency of extragenital foci in these children makes it not surprising that 8 of the 11 patients were in bad condition when admitted to the hospital. Surgical treatment consisted of orchidectomy in 7, and epididymectomy in 2 (of which one was bilateral). Three of these children (over 27 per cent) are known to have died. The cases have not been followed a sufficient length of time to make these figures on mortality significant.—*Genital Tuberculosis in Male Children, J. D. Barney, Am. J. Dis. Child., December, 1921, xxii, 565.*

Antigenic Properties of Friedmann Tubercle Bacillus in Children.—Skin tests made with tuberculin from human and turtle bacilli were utilized to establish a biological relationship between the two varieties of bacilli. Friedmann claimed that newborn infants injected with turtle bacilli showed a positive Pirquet reaction (using human type, old tuberculin) eight days later, but that subsequently the test was again negative. The author repeated this experiment on infants and young children, using the more delicate intracutaneous reaction, but with entirely negative results. Tuberculous children were next subjected to intracutaneous tests with tuberculin from two different strains of cold-blooded bacilli. Six tuberculous children who had recently received intramuscular injections of Fried-

mann bacilli for therapeutic purposes were tested, 5 reacting positively with both tuberculins in dilutions of 1/1000. Of 8 tuberculous children who had not been treated with the Friedmann vaccine, 7 reacted positively. Fifteen children with negative tuberculin tests were next tested after receiving intramuscular injections of 3 mgm. of turtle bacilli. Of these, 11 gave positive reactions with the turtle tuberculin, but none reacted to old tuberculin. Four guinea pigs, injected intraperitoneally with turtle bacilli and given turtle tuberculin subcutaneously nine and fourteen days later, died within three days, whereas the control animals, injected subcutaneously with old tuberculin, survived.—*Zur Frage der antigenen Eigenschäften des Friedmannschen Kaltblütertuberkelbacillus, S. Meyer, Monatschr. f. Kinderhk., August, 1921, xxi, 481.*

Eradication of Animal Tuberculosis.—According to records of the department of agriculture, 2 per cent of the 35,113,077 hogs, slaughtered under federal inspection in 1908, were "retained" for tuberculosis. Since then the number of animals infected has increased about 1 per cent each year until, in the fiscal year ending June 30, 1921, 12.5 per cent of 37,700,000 slaughtered animals were retained. On the average, one out of every eight hogs in the United States has tuberculosis. Only about 1 per cent of the animals killed are wholly condemned, since hogs are usually slaughtered when young and before the disease becomes generalized. At the Chicago market last year the loss was 54,325 hogs weekly. Schroeder estimates that 95 per cent of tuberculosis in hogs comes from cattle. Since 1907, when the nation-wide campaign for the eradication of tuberculosis in cattle was organized, there has been a reduction of one-sixth in the percentage of cattle retained for tuberculosis at our market centres, while the percentage of hogs retained has been one-fourth more. This increase among hogs may be related to the great increase of tuberculosis among poultry during recent years, since chickens, dead from tuberculosis, are commonly eaten by hogs. The British Royal Commission showed that the avian bacillus may cause localized lesions in hogs. A systematic effort should be made to reduce the incidence of the disease in poultry. The success of the federal and state accredited herd plan for testing cattle has been remarkable, eighty thousand herds now being under supervision after an initial period of three years. The organization is conducted by the United States bureau of animal industry. Congressional appropriations have increased from $500,000 to $2,000,000 in three years and state funds from less than a half million to $4,000,000 in four years. Greater efforts must be put forth, because it is gross waste of national wealth to permit an animal loss of $30,000,000 when an expenditure of $10,000,000 annually will in a short time eliminate 95 per cent of the burden. Further than this, the elimination of bovine tuberculosis may reduce human tuberculosis 50 per cent. If the work of eradication is to progress, the counties must assume a share of the expense; in some places this has been done. Since public opinion is the greatest influence, the campaign of education should be intensified.—*Coöperation in the Eradication of Tuberculosis,—H. R. Smith, Am. J. Vet. M., 1921, lx, new series xiii, 310.*

Increase in Tuberculosis-Free Herds.—Latest report of the tuberculosis-eradication work by the United States States Department of Agriculture shows that a total of 204,892 head of cattle in 8,839 herds have been accredited by the government as free from tuberculous infection, while 702,590 additional cattle in 56,113 herds have already been once tested and found free from the disease. On August 1, 1921, a total of 1,294,159 cattle in 79,341 herds were under supervision in the tuberculosis-eradication campaign. Furthermore, there were 218,531 cattle in 14,494 herds on the waiting list for testing. There is a constant increase in the number of animals and herds tested and accredited and in the demands on the part of herd owners who desire to place their cattle under federal and state supervision.—*Note from Jour. Amer. Vet. Med. Assoc., November, 1921, lx, 194.*

Prognosis of Tuberculous Pleurisy in Children.—The majority of children who develop pleurisy with effusion give a positive tuberculin test, and it may be assumed, unless the disease originates as a complication of some other infection (rheumatism, sepsis, the infectious diseases, etc.) that all pleurisy in childhood is due to tuberculosis. In the present series of 78 cases of pleurisy all are therefore considered to be of tuberculous origin, although tuberculin tests were made in only 40 instances. Of the 78 children, 39 were reëxamined after periods of one to nineteen years for evidences of their former trouble or other tuberculous lesions. Thirteen of the remaining children were found to have died (only one, however, in the hospital, and the others at varying times after discharge) and 26 could not be

reached for reëxamination. Forty-one per cent of those examined in later life were completely cured, several of these showing definite abnormalities at the first of the subsequent examinations but complete return to the normal at a later period. Only 10 per cent showed marked abnormalities referable to the old pleurisy on physical examination or roentgenographic study, and 38 per cent much slighter changes. Many cases histories are cited, to show that the prognosis of tuberculous pleurisy in childhood is in general very good, and that fibrous changes may show regression for many years, to the point of complete disappearance of the abnormality.—*Beitrag zur Prognose der tuberkulösen Pleuritis der Kinder, E. Nobel and R. Steinebach, Zeitschr. f. Kinderhk., November 22, 1921, xxxi, 98.*

Tuberculous Diverticula in Esophagus of Bull.—In a single case three diverticula, all of tuberculous origin, were encountered, which possessed the characters of diverticula in man caused by epithelial invasion, traction and pulsion. One, 12 cm. from the bifurcation of the trachea, was a small perforation communicating with a tubercle in the external wall of the esophagus. Microscopically, it was found that epithelium had extended 0.5 cm. past the orifice of the perforation, establishing a sinus. Another, some centimetres lower, was in the form of a sac-like appendix, at the end of which was a tuberculous lymph node. It had the aspect of a pulsion diverticulum. In the other, near the bifurcation, shaped like a horn, 4.5 cm. long, and connected with a tuberculous abscess, the muscles were retracted and the walls partially covered with epithelium.—*Diverticules tuberculeux—dits diverticules de traction—de l'oesophage d'un boeuf, J. Kragh, Comp. Rend. d. Soc. Biol., October 22, 1921, lxxxv, 755.*

Diagnosis of Tuberculosis in Fowls.—Tuberculosis is a common disease of the fowl, characterized by "going light," to use the poultry-man's term. Geese, turkeys and pigeons are also subject to the malady. The symptoms are few until the disease is far advanced. In the later stages the comb appears anemic, the bird is very light, the sternum is almost devoid of flesh and the appearance is generally feeble. The fowl may remain in one position with the head down close to the body and the tail feathers drooped. The appetite is usually poor. In fowls tuberculosis is chiefly a disease of the abdominal organs, especially the spleen, which is affected in about 90 per cent of the cases. The lesions are found in the organs themselves and not in the regional lymph nodes as in the case of other animals. Caseation rather than calcification is the rule. Nodules about the size of a pinhead or larger are uniform in size and equally distributed. Nodules, the size of a pea, appear throughout the length of the intestinal wall. This appearance may resemble that of an infestation with *davainea tetragona* the parasite causing nodular taeniasis. A heavy infestation of the air sac mite, *cytodites nudus*, will cause emaciation; but the lesions of tuberculosis are absent and the parasites appear as white specks on the folds of the mesentery. In aspergillosis emaciation is prominent, but the fungoid growth in the lung or between the lungs and thoracic walls differentiates it. Tuberculous lung lesions are relatively rare, and when present there is usually extensive abdominal involvement also. Bumble foot may be confused with the articular form of tuberculosis, and is differentiated by postmortem examination and the subcutaneous location of the lesion. Symptoms simulating tuberculosis may appear in birds infested with intestinal parasites.—*Clinical Aids in the Differential Diagnosis of the Common Poultry Diseases, F. R. Beaudette, Am. J. Vet. M., 1921, lx, new series xiii, 283.*

Pathology of Pulmonary Tuberculosis.—Considering the apparent susceptibility of the lung to infection with the tubercle bacillus, it seems reasonable to believe that first infections lodge in the body by the inhalation of small numbers of bacilli. Ghon found that only exceptionally were these primary foci at the apex and so one must conclude that there is no special susceptibility of this region of the lung for inhaled bacilli. The intrapulmonary lesion together with that produced in the tracheobronchial lymph nodes, Ranke has termed the primary complex. Following the establishment of this primary complex the disease in childhood may become generalized by way of the blood and terminate with meningitis. Usually, however, this primary stage heals and the next lesion to attract attention is one of a more chronic nature located at the apex and tending to spread caudalwards. This is chronic pulmonary phthisis. It is well known that viable tubercle bacilli remain within healed tubercles, and the work of Liebermeister has shown that the circulating blood may frequently contain tubercle bacilli. The fibrous investment of the primary tubercle would preclude any extension by way of the bronchi, and the lymphatics can be practically eliminated. The bacilli carried to the tracheobronchial lymph nodes may pass

through the nodes and by way of the upper portion of the thoracic duct enter the venous blood when, passing through the right heart, they will be returned to the lungs. Tendeloo's studies have shown that the conditions at the apex which favor lodgment of the tubercle bacilli are a relatively shallow respiratory excursion and a consequent slowing of the blood stream. Thus, while the blood will carry the bacilli to all parts of the lung, they will find lodgment in greatest numbers at the apex and from there the phthisical process will spread; or it may heal, leaving a scar. Such may be the purely mechanical factors concerned in the establishment of the apical lesion; but, in addition, immunological factors come into play. As a working hypothesis, one must think of the attack upon the tubercle bacillus as a lysis, not complete, or otherwise there would be no tubercle; but at least a more or less imperfect destruction of the bacilli together with a cellular reaction. This destruction cannot be accomplished by nontuberculous human tissues; it is a property of allergic tissue only. Here one recalls the doctrine of the latency of the tubercle bacillus in the tissues (Baumgarten, Bartel, Beitzke, et al.). The bacilli during their latent period excite no cellular reaction, but they are not inert; they are stimulating a condition of allergy in the body cells. Thus, after a primary infection, the bacilli remain latent until sufficient allergy has developed, when the tissues are able to cope with them. Superinfection may be of both exogenous and endogenous origin, but the latter is probably the type most effective in bringing about a progressive lesion. The apical lesion spreads by way of the bronchi and the blood stream, the lymphatics playing very little part. There are repeated focal reactions about the tuberculous nodules due to the presence of destruction products of bacilli in the blood which bathes it. This leads to fibrosis. Ranke has emphasized the failure of the lymph nodes to participate in this stage of the intrapulmonary reaction. In uncomplicated phthisis, meningitis and miliary tuberculosis are also lacking; an additional strain such as diabetes or pregnancy is necessary. This is probably due to the strong allergy developed by an extensive pulmonary lesion. Only when this allergy is reduced by an extraneous factor do the bacilli circulating in the blood have opportunity to gain a foothold in remote organs. Immunity to tuberculosis exists only in the presence of tuberculosis. The tissue reactions are a manifestation of this immunity.—*Zur Pathologie der Lungentuberkulose, I. Phthisiogenese, Huebschmann, Münch. med. Wchnschr., October 28, 1921, lxviii, 1380.*

Tuberculosis in a Shetland Pony.—Only five cases of tuberculosis in American horses have been found reported in the veterinary literature, although a considerable number have been reported from Europe. The Shetland pony in which tuberculosis developed was six years old and was kept on premises where there were tuberculous cattle. The animal died about six months after it began to lose flesh. At autopsy an enormously enlarged cheesy lymph node, 8 by 10 inches, was found in the mesentery. Numerous pea size to walnut size nodules, resembling the pearls of bovine tuberculosis, were observed beneath the serosa of neighboring intestine, abdominal wall and diaphragm. Adhesions were present. The spleen and lungs showed no macroscopic tubercles. Hundreds of acid-fast bacilli were present in the tubercles. A cockerel and several guinea pigs and rabbits were employed in inoculation tests that identified the bacillus as bovine in type. The fact that this strain was highly virulent for experimental animals indicates, according to Cobbett, that it was derived directly from the ox. It is also shown by this case that tuberculosis in the horse is likely to assume the chronic form and develop slowly as it does in other species of farm animals.—*Tuberculosis in a Shetland Pony, B. A. Beach. F. B. Hadley and H. B. Piper, Am. J. Vet. Med., February, 1922, lx, new series, xiii, 600.*

Lymphoid Formations in the Lung.—There has been disagreement between histologists and pathologists upon the cells of the alveolar wall which take part in the formation of the tubercle, the former holding that besides the endothelium of the vessels there are only epithelial cells, which may desquamate and become phagocytic, while the latter believe that the walls contain cells of lymphoid origin. The author follows the second belief and includes in the lymphoid group certain nests of nuclei and also some giant cells resembling megalokaryocytes. Such cells are often seen in the dog at the point of enlargement where alveolar walls join. They are present, although less numerous, in the rabbit. Although very similar to epithelial cells they may be distinguished by the fact that their nuclei contain less chromatin and their cytoplasm is less readily seen. The giant cell type has been seen in all animals examined, man, dog, rabbit, guinea pig and cat. Because of its resemblance to the giant cell of bone marrow, its presence in the lung has been attributed by some investigators to embolism from the bone marrow. This is unlikely. These cells may measure 20–30 micra in their greatest diameter and vary considerably in shape. On the basis of the similarity of

these cells to those seen in the spleen of the white mouse the author places them among the lymphoid elements, and assigns them the rôle of responding to irritation, as in the formation of nodules in tuberculosis.—*Sur la présence de formations lymphoides diffuses dans le poumon, A. Guieysse-Pellissier, Comp. Rend. d. Soc. Biol., October 15, 1921, lxxxv, 641.*

Phagocytosis of Inhaled Particles in the Lung.—Contrary to the generally accepted view, siliceous dusts are not always dangerous. When breathed in with coal, as is the case with coal miners who breathe in shale with coal dust in certain localities, the harder dust produces a minimum of damage. This accords with the recent experimental work of Mavrogordato who thought that the harmful dusts are those which are not eliminated. Carbon particles are quickly phagocyted and eliminated; harder dusts, as shale or silica, are less readily engulfed and less easily eliminated. Dust is eliminated from the lungs in one or more of three ways: (1) by the bronchi, by phagocytes of whatever kind which may be carried back through bronchi and trachea and thus be spat out; (2) by lymphatics, which is probably the most used path of exit, when particles may reach the lymphatics back of the alveolar walls and be carried to the nodes at the hilum; and (3) by the blood, by phagocytes which may engulf the dust in the alveoli and wander into the alveolar capillaries. Whatever the path of elimination, phagocytosis plays an important part in the process. As to the type of cell or cells involved in phagocytosis, nothing is absolutely certain. Alveolar epithelium, vascular endothelium and "a variety of cells" have been held by various workers to be the responsible type. Very good evidence that the endothelial cells are the phagocytes has been adduced by Permar and others by vital staining methods. In this Slavjansky's claim of 1869 has been confirmed. Factors influencing phagocytosis may or may not be such as the absorptive power of particles of dust (Haldane), or their size, hardness, acidity, smell, etc. (Collis). These are thought by their advocates to explain, at least in part, the harmfulness of silica and the relative harmlessness of certain other dusts. Particles are taken up promptly by phagocytes and the mechanism of elimination is quickly set to work; for dust cells have been found in tracheobronchial nodes twenty to twenty-four hours after introduction of the pigment. This rate may not be constantly maintained as dust accumulates; especially since there is a proliferation (with obstruction?) of the lymphoid tissue and a fibrosis in these bodies and along the lymphatics. But dusts vary as to the rate of phagocytosis. Fenn has shown that polymorphonuclear leucocytes of the rat ingest carbon particles four times as readily as quartz; and this may be a point of considerable importance. Elimination of dust cells by the bronchi has led both Haldane and Mavrogordato to suggest the addition of harmless dusts, such as coal, to the dangerous dusts (silica) in mines and factories, believing that in this manner both dusts would be removed from the lungs.—*Modern Views upon the Development of Lung Fibrosis, C. K. Drinker, Jour. Industr. Hyg., February, 1922 iii, 295.*

Tissue Reactivity to Tuberculosis.—The typical constitutional anomalies are characterized by varying reactivity to stimuli. In Stiller's *status asthenicus*, characterized by *habitus phthisicus* and *thorax paralyticus*, the reactivity of the tissues is diminished, the body has no immunizing power, in the lymph nodes no tendency to proliferation and increased lymphocyte formation is noted, and in the destroyed parts connective tissue proliferation is either lacking or very slight. The inflammatory lymphatic-arthritic diathesis of the French authors and of Pfaundler, associated with inflammation of the skin, and mucous, serous and synovial membranes, with a tendency to anaphylactic symptoms, lymph node swelling, connective tissue proliferation, increased irritability of the autonomic nervous system, suggests an increased reactivity of the tissues to stimuli and is, therefore, termed by the author *status irritabilis*. The liability to tuberculous infection, antibody formation and protein sensitiveness is increased in this group. Pulmonary lesions have a good prognosis, owing to the tendency to connective tissue proliferation and fibrous encapsulation.—*Die Störung der Reaktionsfähigkeit der Gewebe als biologisches Prinzip abwegiger Körperverfassung bei Tuberkulose, Borchardt, Deutsch. med. Wchnschr., September 29, 1921, xlvii, 1159.*

Tuberculosis of Blood Vessels.—Four varieties of tuberculosis of the peripheral blood vessels are distinguished: 1. Changes arising in the lumen. 2. Involvement of the media due to extension from the vasa vasorum. 3. Periangitis having its origin in the lymphatic sheath. 4. Erosion tuberculosis *per contiguitatem*. In tuberculosis associated with caseation bacilli enter the circulation; they are few in number, because this condition is usually preceded by thrombosis. Large numbers of tubercle bacilli

associated with rapid multiplication give rise to an acute inflammation. Liberation of large amounts of endotoxins from destroyed bacilli produces the typical histological picture of tuberculosis. Chronic inflammatory changes are due to the action of small numbers of bacilli. The liability to involvement is greatest in the adventitia, negligible in the media, and it develops in the intima only under special circumstances. The large blood vessels show no tendency to tuberculous infection, while the small vessels and capillaries frequently participate in the formation of the granulation tissue. In miliary tuberculosis intima tubercles have been seen in the larger vessels (pulmonary veins and thoracic duct). Animal experiments as well as histological observations of human tissues are more in favor of a periphlebitic origin of the intima tubercles. The intima tubercles of the arteries may be explained by localization of bacilli in atheromatous ulcers. The chronic inflammatory changes in the small veins of the greater circulation give no microscopic finding identical to typical tuberculosis, though inoculation into guinea pigs proves positive.—*Tuberkulose und peripherisches Gefässsystem, G. Liebermeister, Deutsch. med. Wchnschr., September 8, 1921, xlvii, 1054.*

Influence of Walking on Pulmonary Ventilation.—In the normal subject pulmonary ventilation is increased during walking but returns to normal within five minutes after coming to rest. The effect was studied in patients with icterus, cardiac lesions, hyperthyroidism, emphysema, chronic bronchitis and sclerosis of the lungs. In tuberculous persons the rhythm is often normal; but if the lesions are extensive and bilateral, walking produces increased ventilation which is not very pronounced but quite lasting.—*Influence de la marche sur la ventilation pulmonaire chez l'homme normal et chez l'homme malade, C. Archard, Binet and Lange, Meeting, Académie de Médecine, January 10, 1922, reported in Le Prog. Méd., January 21, 1922, no. 3, 33.*

Lung Apices in Pleurisy and Pneumonia.—Increased obscurity of the apices in pneumonia and dry and exudative pleurisy cannot always be diagnosed as apical tuberculosis. In contradistinction to Tendeloo, Koester's findings are in favor of the development of atelectatic foci at a distance from the compressing exudate. In 10 of 13 cases of exudative pleurisy the X-ray plates disclosed diffuse apical obscurity of the involved side, while the apex of the unaffected side revealed the same findings three times. Nine cases of dry pleurisy showed diminished illumination of the apex on the affected side; this phenomenon is explained by the diminished ventilation of the implicated parts. Similar findings were noted in 3 cases of pneumonia.—*Verhalten der Lungenspitzen bei Pleuritis und Pneumonie, F. Köster, Deutsch. med. Wchnschr., September 8, 1921, xlvii, 1066.*

Immunopathology of Tuberculosis.—The successive events occurring during the process of establishing immunity to tuberculosis are briefly given as follows: The immunity may be established by means of the living tubercle bacilli that have located in the body naturally, or by artifically introducing dead tubercle bacilli (injected subcutaneously). 1. The above living or dead tubercle bacilli are phagocytized. 2. The phagocytes produce the agglutinins which are immune bodies having a lipolytic action whereby the wax capsule of the bacillus is dissolved and the bacillary protein (endotoxin) liberated. 3. and 4. The endotoxin is ectodermotropic, that is, it anchors itself to the cells of the epidermis. 5. The cells of the epidermis, because of stimulation by endotoxins, produce lysins. 6. The lysins are proteolytic in their action whereby the endotoxin (bacillary albumin, nucleoprotein) is broken down into the soluble exotoxin (albumose, peptone, nucleoalbumose). 7. Exotoxin is mesenchymotropic and anchors itself to all body cells of mesenchymal origin. 8. The mesenchymal cells produce, as the result of the stimulus exerted by the exotoxin, the precipitin. 9. The precipitin breaks down the exotoxin into polypeptids, aminoacids and purin bases, of which some are soluble. The mixture of these substances is the so called anaphylotoxin. 10. This mixture of substances is usually excreted. Only occasionally are they retained in the joints of the body.—*Zur Immunopathologie und Therapie der Tuberkulose, H. Hollaender, Ztschr. f. Tuberk., October, 1921, xxxv, 81.*

Antigenic Properties of Tuberculin.—Attempt was made to confer specific sensitization on guinea pigs by injection with old tuberculin. In no case did any type of sensitization develop following a single injection of 0.1 to 0.2 cc. undiluted tuberculin. Repeated subcutaneous and intracutaneous injection with 0.2 cc. at intervals of several days, however, occasionally conferred such sensitization that guinea pigs responded to an intravenous injection of 0.2 to 0.3 cc. with marked drop in temperature and other symptoms of anaphylactic shock. Control guinea pigs treated similarly with the glycerol broth used in the

preparation of tuberculin did not exhibit these symptoms. Certain animals treated intensively also exhibited Arthus phenomena at the site of injection. In no case was it possible to sensitize guinea pigs with tuberculin so that typical three color skin tests could be obtained on intracutaneous inoculation with 0.02 cc. tuberculin. Occasionally, as a sequel to a new injection, in the course of intensive treatment, inflammation was noted at sites of previous injection.—*Über antigene Eigenschaften des Tuberkulins, E. Seligmann and F. Klopstock, Ztschr. f. Immunitätsforsch. und exper. Therap., January 19, 1922, xxx, 467.*

Law of Active and Inactive Immunity.—The newly discovered law is summarized as follows: 1. In the ill the immunity state is only active: in this condition the immunity is utilized all the time. 2. In the course of illness there exists only "active immunity" (*Gebrauchsimmunität*). 3. After illness the protected have, besides "active immunity" also "inactive immunity" (*Bereitschaftsimmunität*). 4. In the healed, "inactive immunity" mainly exists. It cannot be measured. In the "cured" or protected cases the immunity cannot be determined from the immune bodies found.—*Klippen des Verständnisses. Und die Ableitung eines neuen Leitsatzes. Der Leitsatz der aktiven und inaktiven Immunität, H. Much, Beitr. z. Klin. d. Tuberk., February 10, 1921, xlvi, 396.*

Testing Blood Immunity in Tuberculosis.—In testing the serums of tuberculous patients with partial antigens or antigen mixtures, a positive reaction with the antigen mixtures can indicate that the serum contains one or more of the partial antigens contained in the mixture. A negative reaction can mean the complete absence of all the partial antigens or the presence of individual partial antigens, which can only be determined with the individual partigens. It is concluded, therefore, that it is wrong to test blood immunity with antigen mixtures.—*Zur Prüfung der Blutimmunität bei Tuberkulose, V. Čepulič, Beitr. z. klin. d. Tuberk., February 10, 1921, xlvi, 462.*

Agglutination in Tuberculosis.—The waxy envelope of the tubercle bacillus prevents the free diffusion of soluble substances between it and its environment. This fact doubtless explains the relatively small production of humoral antibodies to the tubercle bacillus, and at the same time the slight effect of such antibodies as are formed upon the bacilli in a lesion. In the same manner, it prevents agglutination of bacilli by antisera, and therefore limits the use of a very important diagnostic measure. But this difficulty may be obviated by appropriate chemical measures, consisting essentially of the removal of a certain amount of the fatty capsule. This effect is accomplished by the use of ether vapor in a special apparatus figured in the text, in which a constant stream of ether vapor is kept bubbling through a bacillary emulsion. Bacilli so treated are capable of stimulating specific antibody production in experimental animals, and thereby influencing the course of the disease, and they also readily form an appropriate suspension for the demonstration of agglutination. Examination of 176 patients is reported. Positive reaction occurred with 93 per cent in a dilution of 1:60 or higher, reaction occurring sometimes at 1:800. In 95 per cent of nontuberculous cases the reacton was negative.—*Contribution à l'étude du diagnostic de l'infection tuberculeuse, W. Fronet, Ann. d. l'Inst. Pasteur, November, 1921, xxxv, 797.*

Significance of Partial Antigens for Tuberculosis Problem.—By MTbR preliminary treatment the course of tuberculosis was retarded to a certain extent in a few animals. This result was not obtained with the single partial antigens and their artificial mixtures. Stimulation of the antibody formation by the fat of the tubercle bacilli does not prove the specificity of this substance, since the same effect may be produced by lecithin and other nonspecific esters. The specificity of the fat partigens was tested on 60 nursing children; in 3 tuberculosis-free cases a reaction was noted which completely corresponded to that in tuberculous children. Attempts to separate the nonspecific component from the fat partigens failed, since the ether extract, as well as the remnant of the fat partigen, produced the same effect. For the determination of the rôle of the fat in the fat partigen reactions, lipoids were extracted from normal organs of tuberculosis-free persons by means of ether and alcohol; and these lipoid mixtures were diluted with water and mixed with old tuberculin. With the latter solutions, as well as with an aqueous old tuberculin control solution, cutaneous reactions were induced. The effect of the tuberculin was found to be modified by any fat mixture; the reactions developed gradually, did not appear before 3–5 days and reached their acme after the control reaction subsided. In bone tuberculosis the fat tuberculin solutions produced the same intense reactions as were obtained

with the fat partial antigens. From these findings the theory of specificity of the tubercle bacillus fat is not borne out. Tuberculous infection is governed by a toxic and a bacterial principle. The former produces the *Absättingungsimmunität;* the latter the *Spaltungsimmunität.* The *Spaltungsimmunität* is the cause of the hypersensitiveness of the skin. In gland tuberculosis of children the toxic symptoms disappear after old tuberculin treatment, which stimulates the formation of antitoxin and favors in this way the neutralization of the toxins. MTbR treatment in these cases results in aggravation, since it produces antibodies which split the bacilli without neutralizing the toxins. In adults the MTbR treatment is more successful when reinforced by antibacterial immunity.—*Die Bedeutung der Partialantigene für das Tuberkuloseproblem, H. Langer, Berl. klin. Wchnschr., November 22, 1920, lvii, 1120.*

New Insight into Blood and Cell Immunity.—According to the views of the authors the immune reactions of serums are of absolutely no value in determining or prognosticating tuberculosis and are susceptible to rapid changes. Only by testing with the partigens, not with the partigen mixtures (trade tuberculins or bacilli), is an insight possible. The cell immunity is, in comparison to the humoral, permanent.—*Neue Einblicke im Blut und Zell-Immunität, H. Much, M. Pinner and V. Čepulič, Beitr. z. Klin. d. Tuberk., February 10, 1921, xlvi, 417.*

Fat Antibodies.—Data from man are more valuable than from guinea pigs, since the latter have only slight cell immunity. The fat reactions do not depend upon admixed proteins. The reactions to *N* occur in higher dilutions than to *A*. Many cases do no react biologically to *A;* but, in higher concentrations, reactions are of the nature of a foreign body reaction. Immunization to *A* does not affect the reaction to *N*. An assumption of two different proteins is also not tenable. A case with insufficient *A* antibodies can be benefited by *A*, but not by *N* treatment and vice versa. In altering the immune picture the fat antibodies play a significant part.—*Fettantikörper, H. Much, Beitr. z. Klin. d. Tuberk., February 10, 1921, xlvi, 407.*

Reactivity of Commercial Tuberculins.—Three trade tuberculins (Höchst, Ruete-Enoch, and Sächsisches Serumwerk) were tested comparatively by the intracutaneous and complement fixation methods, and although all the tuberculins had been tested by the government and standardized against the standard tuberculin, a marked difference in the manner of their reaction could be seen. Objection is raised to the government test in guinea pigs which only determines the pure tuberculin, the toxic substance *Tb L*, while the other partigens occasioning the intracutaneous and complement fixation reactions are left out of consideration.—*Verschiedene Reaktivität der Handelstuberkuline, V. Čepulič, Beitr. z. klin. d. Tuberk., February 10, 1921, xlvi, 445.*

Protein Split Products and Antigens of Tubercle Bacillus.—The pure, simple amino acids (glycerol, leucin and tyrosin) have no effect upon the immunity reaction of the skin. The higher amino acids (of brain, testes, spleen, kidney, pancreas, heart and carcinoma tissue) affect the partigen reaction of the skin in different ways: they have no appreciable action toward protein partigen *A;* they retard the reaction to water soluble partigen *L;* they partly increase the reaction to lipoid partigen *F;* they, without exception, increase the reaction to neutral fat partigen *N*. Lipoids have no effect upon the skin immunity reaction.—*Eiweissendprodukte und Antigene des Tuberkelbazillus, geprüft an der Zelle, R. Trautmann, Beitr. z. klin. d. Tuberk., February 10, 1921, xlvi, 448.*

Relation Between Tubercle Bacilli and Molds.—Partigens similar to the Deycke-Much preparations were prepared from *Penicillium brevicaule.* The penicillium partigens gave in general a positive skin reaction when a reaction was obtained with the tubercle bacillus partigens but the reaction was always weaker. It is concluded that penicillium contains certain reactive substances which resemble those in the tubercle bacillus but in lesser amount, so that the relation, if such exists, is a distant one.—*Über Beziehungen zwischen Tuberkelbazillen und Schimmelpilzen, H. Schmidt, Beitr. z. klin. d. Tuberk., February 10, 1921, xlvi, 456.*

Cultivation of Tubercle Bacilli.—The human tubercle bacillus grows equally well on culture tubes containing slants of glycerol agar or egg medium (Petroff's), regardless of whether the tubes have been capped with waxed cloth or with tin foil, securely held in place with rubber bands, thus indicating a ready access of atmospheric air in the folds of the tin foil, in spite of precautions to prevent this means of escape of the carbon dioxide produced by the respiration of the bacilli. Tin foil capping

does not account for the low percentage (27.3 per cent) of positive cultures obtained by Corper, Frala and Kallen in cultivating microscopically positive sputa. The addition of "aminoids," beef or casein to the ordinary laboratory glycerol broth has no appreciable effect on the growth of human tubercle bacilli on this medium; such an addition may even markedly retard the growth of the bacilli as was found to be the case with "aminoids."—*Cultivation of Tubercle Bacilli, F. L. Goodman and Mary Moore, Jour. Infect. Dis. January, 1922, xxx, 58.*

Rapid Cultivation of Tubercle Bacilli.—Certain strains of tubercle bacilli are described which will grow on potato or gelatin without glycerol, and not only *on* broth but *in* it. Three such strains, one of bovine and two of human origin, are described. The bacilli cultivated in potato broth grew in twenty-four hours at 37°C., were nonacid-fast, Gram positive, and had a morphological resemblance to the bacterioides of legumes. Their identity with tubercle bacilli was shown by a return to acid-fastness after ten days on glycerolated potato, and by their agglutination by the sera of tuberculous patients. However they were avirulent.—*Un procédé de culture homogène rapide du bacille tuberculeux, A. Vaudremer, Compt. Rend. d. Soc. Biol., December 10, 1921, lxxxv, 1055.*

Action of Gastric Juice on Tubercle Bacillus.—Gastric juice removed from the stomachs of persons free from gastro-intestinal disease, at various intervals after an oatmeal test meal, showed very little power of destroying tubercle bacilli in sputum which was exposed to it for 90 minutes, and tubercle bacilli in mouth washes which were exposed for 90 and 180 minutes respectively. In one case a total acidity of 62, in another of 54, and in a third of 24 failed to destroy the bacillus. The gastric secretion may possibly have destroyed the tubercle bacilli in a very weak emulsion under similar conditions, but the number of bacilli used (100) was so small that it cannot be considered a fair test; and even the control test with this weak emulsion proved negative in a guinea pig. The protection against the tubercle bacillus afforded by the gastric secretion is apparently not perfect. But it must be remembered that the dilution of contents and the motor activity of the stomach probably play a large part in this mechanism of protection; and these latter factors cannot be satisfactorily experimented upon *in vitro*. These results are in general agreement with the conclusions arrived at by Allan MacFadyen under different conditions and with bacteria other than B. tuberculosis as long ago as 1887. In the 4 cases examined the untreated gastric juice contained no tubercle bacilli as judged by the inoculation test. Authors know of no records which show whether or not tubercle bacilli have been found in gastric juice in persons not suffering from clinical tuberculosis. This point may have an important bearing on the portals of entry of the bacillus.—*The Bactericidal Action of Gastric Juice on B. tuberculosis, J. Inkster and S. R. Gloyne, Brit. M. J., December 17, 1921, no. 3181, 1024.*

Leucocytic Reaction to Tubercle Bacilli.—Following intravenous injection of dead tubercle bacilli in rabbits the white cell count rises and remains high for thirty to forty days. On injection of living bacilli a primary increase is followed after two to three months by a return to normal. On injection of sensitized dead bacilli no increase in leucocytes occurs; injection of sensitized living bacilli leads to a progressive increase after forty days. A hypoleucocytosis occurs in the first twenty-four hours. Injection of dead bacilli, sensitized or not, leads first to a decrease in the mononuclears, followed by an increase after nine to twelve days. Changes in mononuclear count are irregular after injection of living bacilli. Eosinophiles may not be increased. Basophiles are regularly increased. The injection of tuberculin leads to no change in the number or kind of leucocytes in the blood.—*Des réactions leucocytaires consécutives a l'inoculation des bacilles tuberculeux, M.-S. Vagliano, Compt. Rend. d. Soc. Biol. December 17, 1921, lxxxv, 1130.*

Homogenization of Sputum by Autodigestion.—Sputum allowed to undergo self digestion for ten to fifteen days at laboratory temperature separates into two layers,—an upper serous, and a lower thick one equal to one-third to one-half of the original volume. The lower portion contains nearly all the tubercle bacilli.—*Sur l'homogénéisation des crachats tuberculeux par autodigestion spontanée, M. Favre and J. Devuns, Compt. Rend. d. Soc. Biol., November 12, 1921, lxxxv, 858.*

Sodium Hypochlorite as a Substitute for Antiformin.—On account of the cost of antiformin and its tendency to undergo rapid deterioration, with loss of its active principle, chlorine, sodium hypochlorite is preferable. This can be prepared by dissolving 215 gms. of calcium chloride and 286 gms. of soda in 2 litres of water. It is much more stable than antiformin; it renders

sputum homogeneous much more rapidly; its specific gravity is less than that of antiformin, so that the sediment comes down more readily; the sediment spreads more readily; and the bacilli are more readily seen. A 2 per cent solution can be used without danger of dissolving the tubercle bacilli.—*Ist zur Anreicherung von tuberkulosen Sputum Antiformin nötig? F. H. Lorentz, Münch. med. Wchnschr., Sept. 2, 1921, lxviii, 1119.*

Enhancement of Virulence of Non-Pathogenic Acid-Fast Bacilli by Animal Passage.—The pathogenicity of pure cultures of saprophytic acid-fast bacteria, remaining for a long time in the guinea pig body and cultivated again in pure cultures, was studied and the results compared with those obtained with the primary strains and genuine human tubercle bacilli. An increase in the pathogenicity of slightly virulent acid-fast saprophytic bacteria by passage through animals, as found by Schlossberger, Kolle, and Pfannenstiel, was confirmed. The passage strains produced clinical and pathological changes not differing from those induced by human and bovine tubercle bacilli. The first series comprised 6 pigs; 3 were inoculated with 0.00005 mgm. of butter bacillus S_8; and 3 with 0.000005 mgm. of S_{10} obtained from the second guinea pig passage of S_8. The first group showed intense inflammatory symptoms, hypopyon, cloudiness of the cornea soon after infection. The symptoms disappeared in the course of 2 or 3 weeks and the animals were still alive six months later. The second group revealed no signs of irritation for ten days; then the cornea, owing to vascularisation and cloudiness, assumed a flesh-like appearance, perforated and phthisis bulbi resulted. Autopsy of 2 animals disclosed swelling of the systemic lymph nodes and enlargement of spleen and liver, which contained yellowish-green foci, differing only by the greenish color from the caseous changes due to genuine tubercle bacilli. In the foci were giant cells and acid-fast bacilli. Further experiments with the same strains confirmed these results. Similar changes were produced by the butter strain S_1 of Rabinowitsch and S_{10} in a second series; only one animal reacted to the original strain with a progressive, nonperforating inflammation of the eye. Frog tubercle bacilli and their first passage strain were followed by changes identical to those of the first series. Experiments carried out with Friedmann's bacilli differed from the previous one, in that the primary as well as the passage strains seemed to have a special affinity for the lungs. The third passage strain of fowl tubercle bacilli gave rise to tuberculous inflammation with perforation of the cornea, swelling of regional nodes, and general systemic tuberculosis, while the primary strain produced tuberculosis-like changes of the eye without swelling of regional nodes.—*Tuberkulose-Studien. V. Zur Pathogenität der säurefesten Bakterien, im besonderen der Passagestämme säurefesten Bazillen (nach Untersuchungen am Auge), J. Igersheimer and H. Schlossberger, Deutsch. med. Wchnschr., May 12, 1921, xlvii, 526.*

Investigations on Saprophytic Acid-Fast Bacteria.—The multiplication and duration of life of acid-fast saprophytes in the warm blooded body was studied in guinea pigs and rabbits. After inoculation with turtle and blindworm baclli metastasis of the bacteria was seen in lymph nodes and organs far away from the site of infection, but a definite multiplication could never be noted. The bacilli could be demonstrated microscopically up to 44 weeks, and culturally up to 32 weeks after inoculation. Cultures of turtle bacilli obtained from guinea pigs and mice did not prove to be more virulent for these animals than the primary cultures. Inoculation of the involved foci, containing many bacilli, into healthy animals did not disclose an increased virulence of the bacteria. None of the 28 guinea pigs treated previously with turtle bacilli in different ways and submitted after shorter or longer intervals to the intracutaneous tuberculin test gave a positive reaction; 43 guinea pigs were infected with human tubercle bacilli subsequent to preliminary treatment with turtle and blindworm bacilli. All developed progressive and fatal tuberculosis. Only a slight increase in resistance to infection was obtained.—*Weitere Untersuchungen über einige den Tuberkelbacillen verwandte säurefeste Saprophyten, B. Lange, Deutsch. med. Wchnschr., May 12, 1921, xlvii, 528.*

Non-Pathogenic Acid-fast Bacilli.—The acid-fast organisms of cold-blooded animals, such as the Friedmann bacillus, are not noticeably pathogenic for warm-blooded animals, though they remain alive in the body of such animals, not only at the site of injection, but also in the lymph nodes and in the spleen. Their pathogenicity cannot be increased by passage through animals. It was not possible to sensitize guinea pigs with certain typical members of this group (slow worm and turtle tubercle bacillus) to subsequent intracutaneous administration of O. T. Koch. Immunization of guinea pigs to tuberculosis by previous administration of tuberculins prepared from slow worm, turtle, or fish bacilli was unsuc-

cessful. In the organs of healthy frogs, especially those whose resistance was lowered by starvation or inoculation, acid-fast organisms resembling the turtle bacillus of Friedmann were found. Morphologically, biologically and antigenically, the turtle, frog, fish and slow worm bacilli are of the same species. The acid-fast organisms of this species, owing to their negligible pathogenicity and their wide distribution in nature, are considered merely saprophytes. The practical application of this study establishes the fact that these acid-fast saprophytes are of no value in the prophylactic immunization of man to the human or bovine tubercle bacillus. Whether the inoculation of man with these organisms or their products is harmful or not is not certain; in view of the animal experiments carried on with them it would seem that such a procedure is harmless. It is improbable that the virulence of these organisms can be increased sufficiently to produce tuberculous disease comparable to that produced by the human or bovine tubercle bacillus in mammals. From the evidence at hand it appears that no conversion of the tubercle bacilli of cold-blooded animals into those of warm-blooded animals occurs.—*Weitere Untersuchungen über einige den Tuberkelbacillen verwandte säurefeste Saprophyten, B. Lange, Ztschr. f. Hyg., July, 1921, xciii, 43.*

Friedmann's Strain of Tubercle Bacilli.—The pathogenicity of the Friedmann strains for cold-blooded animals was tested on 11 toads, 3 blindworms and 1 salamander, which were infected intraperitoneally with 5 mgm. of turtle bacilli. The salamander died twenty-two days later from subacute peritonitis. The other animals were killed after three months in the best of health. Very slight changes were found which might be looked upon as foreign body tubercles. The characteristic signs of tuberculosis in cold-blooded animals were completely lacking. The slight effects of the turtle bacilli on cold blooded animals, their pathogenicity for warm-blooded animals, and their growth at 37°C make it very probable that the Friedmann bacilli represent a mutation form of the human tubercle bacillus.—*Über den Friedmann-Tuberkulosestamm, G. Schröder, Deutsch. med. Wchnschr., March 24, 1921, xlvii, 331.*

Immunizing Power of Friedmann's Remedy.—Two boys, 9–10 years old, with symptoms, signs and X-ray findings pointing to bronchial node tuberculosis, were inoculated (0.2 mgm.) according to Friedmann. The first patient, who showed no reaction at the site of injection, developed a tuberculous epidydimitis five weeks after the treatment. In the second boy, who showed local suppuration following inoculation, tuberculous caries of the ribs became manifest seven months later. These two cases are striking examples against the curative value of Friedmann's vaccine. Abscess formation in the second case cannot account for the lack of success, since it is looked upon by Friedmann as a favorable sign.—*Zur Schutzwirkung des Friedmann-Tuberkulosemittels, Kretschmer, Deutsch. med. Wchnschr., September 1, 1921, xlvii, 1029.*

Early Diagnosis of Pulmonary Tuberculosis.—The diagnosis of pulmonary tuberculosis to-day is at once easier and more difficult than formerly: easier because laboratory facilities are much more readily available to every physician; more difficult because the public demands an earlier and more exact diagnosis. Certain factors in the history should suggest pulmonary tuberculosis. Blood spitting, if the gums and nose can be excluded as a source, is one of these. Pleurisy with effusion should be considered tuberculous until it is proved otherwise. A persistent cough may be referable to any one of a number of conditions, but tuberculosis is always among them. Fatigue at the end of the day, loss of weight and possibly slight flushing should arouse suspicion. Fistula in ano is suggestive. Exposure to infection, where there has been opportunity for repeated and prolonged contact, is sufficient reason for careful study of the case. Once attention is directed to the lungs, it is important to have a complete history, especially with regard to the occurrence of hemoptysis and pleurisy with effusion, a physical examination, roentgen ray examination and sputum examination. In the physical examination, the patient should be stripped to the waist. Inspection and palpation are usually only suggestive, and percussion is less valuable than auscultation. Of the auscultatory data the detection of râles is the most important. Any one with ordinary hearing should be able to detect râles if the proper technique is used. Sometimes the râles are heard only after expiratory cough, and to elicit these the patient is told to breathe out slowly one-half or three-quarters of the air in this lungs, save enough air to cough with, and then to cough, and immediately to take a fairly full, fairly rapid inspiration. The thoracic muscles must be completely relaxed and the cough must be neither violent nor noisy. Particular attention should be paid to the region above the second rib and the third vertebral spine. When these areas are free from disease and the abnormal physical

signs are confined to one or both bases, the burden of proof is on him who diagnoses pulmonary tuberculosis. Stereoscopic X-ray pictures are necessary in diagnosis, if we wish to avoid an uncomfortably large percentage of errors. This is largely because a certain percentage of deep-seated lesions give vague signs. Sputum examination is most important. One should not be satisfied with a single examination. If it is positive it should be checked up; if negative, the test should be repeated many times. One should not accept a statement from the patient that he has no sputum, but should insist that he bring some of the mucus or phlegm that he raises in the morning. The five cardinal data in the diagnosis of pulmonary tuberculosis in the order of their importance are: (1) tubercle bacilli in the sputum (and feces); (2) and (3) moderately coarse râles and a parenchymatous roentgen ray lesion above the second rib and third vertebral spine; (4) hemoptysis; and (5) pleurisy with effusion. The usual râle is the moderately coarse one, heard in the earlier stage only after expiratory cough. Later on, it can be heard following any cough that is not too hard or noisy. Later still, it is plainly evident on ordinary breathing but, under this condition, the case has passed the incipient or minimal stage. This refers only to râles occurring above the second rib and third vertebral spine. Apical râles with a perfectly normal roentgenogram are in the rarest instances due to pulmonary tuberculosis, but it is necessary to be sure about the technique and the interpretation of the roentgenogram. In order to exclude pulmonary tuberculosis, all five of the cardinal data must be absent. If either hemoptysis or pleurisy with effusion occurs alone and the other four data are lacking, a diagnosis of suspected pulmonary tuberculosis should be made. If roentgen ray examination discloses a parenchymatous lesion above the second rib and third vertebral spine in a patient without symptoms at present, a diagnosis of demonstrable, nonclinical pulmonary tuberculosis can be made. The term "unwarranted" is reserved for the case in which information on these five points cannot be obtained. The tuberculin test as it is used to-day is never harmful. It is used only on patients with doubtful or slight roentgen ray lesions, in whom other sufficient data are lacking. Should the test be negative the patient is returned to his home and work with the agreement that should he desire to reënter the sanatorium he will be taken at once. So far no patient has ever applied for readmission. If there is a constitutional reaction without a focal reaction, it is assumed that the pulmonary lesion is inactive; if either physical signs or the parenchymatous X-ray lesion show an increase the lesion is probably not wholly inactive. The question of activity of a pulmonary lesion is a relative one, and it must be remembered that in the vast majority of cases the ultimate outcome never goes beyond an arrest of the disease. In the army, râles were correctly considered an indication of activity because the patient with râles usually broke down under the violent exercise to which he was subjected. In civilian practice it is different, and it is surprising how much work of a proper kind a patient can do provided he lives within his limitations. Under such circumstances the disease may remain quiescent or only potentially active. Pathological activity of a lesion always precedes clinical activity; but how soon clinical follows pathological activity is not easy to say. Neither can it be correlated with physical signs. The occurrence of tubercle bacilli in the sputum indicates pathological activity in possibly 90 per cent of all cases and the presence of elastic tissue in 100 per cent. No other laboratory test is of any value in ordinary practice in the determination of activity. A properly made and interpreted roentgenogram may help in demonstrating pathological activity by showing mottling with ill-defined edges, "cottony" in appearance, blending gradually into the surrounding normal lung picture. Clinical activity is indicated by symptoms. Cough and expectoration and the presence of tubercle bacilli in an otherwise arrested case may have slight bearing in the determination of activity. Tubercle bacilli in the sputum indicate a positive diagnosis, but some patients show bacilli only in the advanced stages of the disease. The extent of the lesions in many cases can be determined only by the combined use of physical and X-ray examinations.—*Certain Fundamentals in Early Diagnosis of Pulmonary Tuberculosis, L. Brown, J. Am. M. Ass., January 14, 1922, lxxviii, 79.*

Mode of Production of Vesicular Breath Sounds.—It is generally agreed that the sound of expiration originates in the larynx. There have been two views of the origin of the inspiratory sound; one that it is produced in the larynx, and another that it is produced in the chest. The term vesicular arose with the current view that this murmur originates in the air vesicles. Auscultation of the larynx proves that the loud and harsh sounds, usually heard during both phases of breathing, will completely disappear when the glottis is opened to its fullest extent. The author, after some practice, was able to open his

glottis completely during breathing. While one examiner inspected his larynx two others auscultated the lungs. After listening to several normal respirations the larynx was opened and the vesicular sound over the lungs disappeared. A conscious and visible tremor of the vocal cords produced a faint expiratory sound. Care was taken to take normally deep inspirations during the experiment. When the author auscultated his own larynx and an examiner auscultated the lungs, it was found that even a faint sound audible over the larynx was also heard over the chest and that, when the larynx was fully opened so as to produce no sound, no murmur was heard over the chest. Over an area where bronchovesicular breathing is usually audible, all sounds could be caused in like manner to disappear, proving that the bronchovesicular quality did not originate in the lesion. To explain how a sound originating in the larynx with high pitch and harsh quality is transmitted to the lungs with low pitch and soft quality, reference is made to the work of Friedrich Müller, Gerhardt and Selling on the physics of lung sounds. The percussion note of the normal chest and vesicular inspiration are essentially of the same pitch, and, with the deepest tones of a bass voice, correspond to a pitch in the large octave or in the upper portion of the contraoctave of the musical scale. But the percussion note and the breath sounds are, at their point and time of origin, noises composed of a large number of tones of varying pitch. The latter correspond to resonating tubes of varying lengths, the deepest tone of the breath sound, for instance, corresponding to a tube length of two to three metres. It has been shown that the audible sound of percussion is that which corresponds to the thorax as a resonating chamber, all other elements of the original "noise" being relatively inconspicuous. The same phenomenon applies to breathing. From the "noises" originating in the larynx a deep tone is picked out, corresponding to the fundamental note of the thorax as a resonator, and this reinforced tone is audible as the vesicular murmur. The bronchial tubes also act as resonators during normal breathing, but these sounds are poorly transmitted through the mass of air cells. Solidified tissue, however, responds not to deep tones but to sounds of higher pitch, thus explaining the origin of bronchial breathing. The width of the bronchi has something to do with the transmitted tone. High-pitched sounds receive their reinforcement in the mouth and nasopharynx; the tones of medium pitch have as resonators the trachea and the larger bronchi, and the lowest tones call forth the resonance of the thorax. In the presence of disease, the conduction, not the mode of production, of lung sounds, is changed. Pectoriloquy, bronchophony and other qualities can be explained in this way. "Noises" produced in other ways follow the same law as, for instance, when the subject breathes through a tracheotomy tube. "Reciprocating breathing," effected by closing the glottis and imparting motion to the air contained in the lungs by alternate abdominal and thoracic contractions, produces vesicular sounds because the pitch is such as to call forth thoracic resonance. It is concluded that the inspiratory murmur, as well as the sound of expiration, originates in the larynx.—*The Mode of Production of the So Called Vesicular Murmur of Respiration, G. E. Bushnell, J. Am. M Ass., December 31, 1921, lxxxvii, 2104*

Biological Relationship of the Turtle Bacillus and Other Acid-Fast Bacilli.—By means of the complement fixation test 116 serums from patients afflicted with various diseases and a small number of consumptives were tested with O. T., human tubercle bacillus emulsions, and smegma, turtle and blindworm bacillus emulsions. The turtle bacillus, in common with the other acid fast bacilli, contains antigenic substances for the complement fixation test. The substance in the turtle bacillus is far less in amount than in lepra or smegma bacilli, but more than in timothy-hay and blindworm bacilli. The turtle bacillus is, therefore, less closely related to the human tubercle bacillus than lepra or smegma bacilli, but more so than the timothy-hay and blindworm tubercle bacilli.—*Biologische Verwandtschaft des Schildkrötentuberkelbazillus mit anderen Säurefesten, V. Čepulič, Beitr. z. Klin. d. Tuberk., February 10, 1921, xlvi, 430.*

Diagnosis and Treatment of Joint Tuberculosis.—Sufficient care is not taken in making a diagnosis in the average cases of early joint tuberculosis. Not only local treatment but also rigid and long continued constitutional treatment is required for tuberculous joints over a period not less than two years, especially as regards weight bearing. The promiscuous opening of tuberculous abscesses and haphazard curetting of sinuses is extremely bad surgery. The end result striven for should not be ankylosis but a functionating joint.—*Early Diagnosis and Treatment of Joint Tuberculosis, J. T. O'Ferrall, Meeting Southern Med. Ass., November 14–17 1921, reported in J. Am. M. Ass., December 17, 1921, lxxvii, 1995.*